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JOURNAL OF THE TELEGRAPH.

VOL. XIV.

NEW YORK, JANUARY 1, 1881.

WHOLE NO. 316.

LITERATURE.

Four Lectures on Static Electric Induction. By J. E. H. Gordon, B. A., Assistant Secretary of the British Association. Delivered at the Royal Institution of Great Britain, 1879. D. Van Nostrand, Publisher, 28 Warren and 27 Murray Streets, New York.

OVER forty years ago Faraday declared that "amongst the actions of different kinds into which electricity has been sub-divided, there is, I think, none which excels, or even equals in importance, that called *Induction*."

The object of these lectures was the study and explanation of such of the laws of induction as are now clearly known.

The introductory lecture of the course considers conductors and insulators the production and action of induced currents. These are very fully stated and illustrated by familiar experiments. The established principles of electric induction are clearly stated and illustrated in these lectures, and the different theories of inductive action discussed. A considerable portion of the concluding lecture is devoted to demonstrating Clerk Maxwell's electromagnetic theory of light, which the lecturer accepts as correct, and as explanatory of the phenomena by which the sensation of light, propagated from a distance, is produced.

At the present time these carefully prepared and instructive lectures are of especial value, and will be read with pleasure and profit by the numerous students of electric induction, and will aid in the practical application of the principles involved by investigators. The work is illustrated with cuts showing the apparatus employed and the experiments made by the lecturer in the course of his lectures, which adds much to its practical value and usefulness.

Journal of the American Electrical Society. Including original and selected papers on telegraphy and electric science. Published by order of the Society. Vol. III., No. 5.

In our last issue we briefly referred to this number of the *Journal of the American Electrical Society*, but its valuable contents entitle it to more extended notice and consideration than we could then give to it. In this connection we would make especial mention of the illustrations which are introduced wherever the subject treated of requires them.

The first paper in the current number is that read by Prof. A. Graham Bell, "Upon the Production and Re-production of Sound by Light," before the American Association for the Advancement of Science, at Boston, last August.

The results obtained by Prof. Bell and his assistant, Mr. Sumner Tainter, in their experiments for the reproduction of sound by light were so remarkable, and the principles involved so novel, that they at once attracted attention and discussion throughout the civilized world. The editors have done well in presenting this paper in the standard publication

of the society, and bringing it prominently before its members.

We do not propose to review this paper, for which we have not the requisite space, but merely to call to it the attention of our readers, who will be amply repaid for the time devoted to its perusal and study.

Following this is a translation by Mr. O. O. Haskins, of an account of "The Telegraph in France," by Alfred Maitre Jean, Controller of Telegraphs.

This is an abstract of a report to the Administration of Telegraphs of the French government, and the details of the telegraphic organization, administration and service are very fully given. In France, as in most other countries, there has been within the last ten years, an enormous development of the telegraphic service. Under the intelligent management of M. Cochery, the Director-General of Posts and Telegraphs, the service has been re-organized and extended to meet the constantly increasing demand for such service from the public, and with favorable financial results. Until within the last few years the French telegraphic service was very defective, and the facilities supplied inadequate to the requirements of the public. Under M. Cochery's management there has been a very marked change in this respect, and the telegraphic service in France will now compare favorably with that of any other European country.

The rapid development of the telephone service soon necessitated the establishment of what are known as Telephone Exchanges, or central offices through which subscribers could be connected and converse with different parties without separate wires being required to each. The sudden and rapid increase in the number of lines centering in the exchanges of the larger cities soon developed perplexing obstacles to the satisfactory working of the exchange system. In the article on "Multiple Switch Boards," by Messrs. O. O. Haskins and C. H. Wilson, an interesting description is given of the means adopted to overcome these obstacles in the Chicago Exchange, which seem to have been excellently adapted to the purpose to be accomplished, and very effectual. This article will be read with interest and profit by all who are engaged in the telephonic service.

The paper by Prof. Carhart discusses the phenomena of "Atmospheric Electricity," and considers at some length theories in regard to their causes. The professor has studied the subject very closely, and he presents a theory which he thinks adequately accounts for the phenomena attending the development of atmospheric electricity, whether exhibited in earth currents as in auroral displays or attending volcanic and earthquake disturbances, or in the more familiar electric discharges from the clouds. The theory which he modestly submits as worthy of consideration is, that the earth itself is the seat of those disturbances that manifest themselves in atmospheric electricity. "Fluctuating Currents," he says, "ebb and flow through the confining walls

of this immense reservoir of cosmic electricity. These follow naturally from great changes in temperature to which the earth's crust is subjected; from these seismic disturbances, occasioned by vast internal convulsions; from immeasurable local strain and compression, the result of upheaval and contraction. The earth, unlike the moon, contains still a vast store of unexpended energy, and in the ebb and flux of its mighty internal contending forces, and the bending and swaying of its magnetic lines of force, in obedience to the magic wand of the sun, there is ample room for the generation of those comparatively feeble forces that manifest themselves in the electrical disturbances of the air."

The importance of uniform and correct time in the operation of railroads is well understood, especially by those engaged in railroad service, and Mr. P. H. Dudley briefly details the different systems which have been from time to time adopted for securing such uniformity. The system, he says, which has proved most satisfactory and effectual is to have the astronomical time sent to the main office and have all the clocks of the line so arranged that at some definite period, each day, or oftener, they may be under the direct control of one man, and he, from correct time signals, sets all the clocks, if either *fast* or *slow*, at every station to one or the same time. This system, of which Mr. Dudley was the originator, has already been adopted on several of the principal railroads of the country.

The adaptation of machine currents to telegraphic purposes in place of the cumbersome and troublesome system of batteries, has long engaged the attention of electricians and inventors. It is but recently that these efforts have met with success; but the principal obstacles have at length been overcome by Mr. Stephen D. Field, a well known and talented electrician and inventor, and during the past year a series of very thorough experiments have been conducted in the main office of the Western Union Telegraph Company in this city by Mr. Field, in conjunction with Mr. G. A. Hamilton, electrician, with a view of arriving at results on which to base a judgment of the relative value of machine and battery currents; and it is probable that soon the dynamo machine will entirely supersede the Callaud batteries at present used in the larger offices. Mr. F. W. Jones, in a paper on "Machine Currents," describes the apparatus used for the purpose, and the process employed. As we hope soon to reprint this, or publish an article on the subject specially prepared for our columns, we will at present only thus briefly refer to Mr. Jones' interesting contribution.

Mr. Geo. D'Infeville contributes two papers to this number, an original article on "Improvement of Mance's Method for Measuring Internal Resistances of Batteries," and a translation from the *Journal Universel de Electricite* of an article on the "Power and Efficiency of Electric Motors." The scientific character of these articles will perhaps

make them of less interest to the general reader, but to the electrician and scientist they will be found very interesting and instructive.

The steady improvement in the character of the *Journal* since the first number was issued is very marked, and reflects much credit, not only to the gentleman under whose supervision the publication has been conducted, but also to the society, which is best known to the public through its representation in its pages.

The Popular Science Monthly, January, 1881. D. Appleton & Co., New York.

The Popular Science Monthly commences the New Year with a very interesting number. It opens with Herbert Spencer's third paper on "The Development of Political Institutions," which is devoted to the subject of "Political Integration." The article, like all that Spencer writes, is clear, original, and instructive. The second article is by Dr. Felix Oswald, on the subject of "Diet." It is an interesting paper on a subject of vital importance to people generally, and will be continued in the February number. Dr. Oswald is a brilliant writer, and has been engaged for a series of articles in this magazine on "Physical Education," of which the present contribution is the first. Professor Tyndall's discussion on "The Sabbath" is continued, and his treatment of the subject is striking and effective. There are besides these a number of articles on subjects of popular scientific interests, which with the departments, not the least interesting and instructive feature of this popular magazine, make up a number of which the publishers and editors may be proud, and which justifies the popular appreciation and support which are extended to it in a constantly increasing degree as its merits and the scholarly care exhibited by its editors become more generally known and understood.

AMERICAN ELECTRICAL SOCIETY.

Seventh Annual Meeting.

We add to the brief account of the proceedings of the seventh annual meeting of the American Electrical Society, printed in our last issue, a more detailed report of matters of interest, then omitted for want of room.

No business was done at the morning session, it being adjourned to two o'clock P. M., to await the arrival of a number of members known to be on their way to participate in the proceedings.

The afternoon session was opened with Mr. E. P. Wright, of Cleveland, the Second Vice-President, in the chair. The reading of the minutes having been dispensed with, the following gentlemen were proposed for membership and accepted, the Secretary being instructed to cast the ballot:

Honorable Membership—Professor Royal E. House, New York; Count du Moncel, Paris, France.

Foreign Membership—Alfred Niaudet, Paris, France.

Regular Membership—George D'Infreville, New York.

The Treasurer's report was read and accepted. The balance on hand at last report was \$161.53, and the receipts since had raised the total to \$450.25. There was now a balance on hand of \$331.95.

The committee appointed to solicit scientific contributions for the *Journal* reported through Professor Carhart. The report was such that, while it was accepted, the committee were not discharged, but held another year.

Mr. C. H. Haskins then read an interesting paper on "Flexible Cords," dwelling especially on the annoyance caused by the cutting off of telephone communication. This cutting off arose from a variety

of causes, the principal being broken connecting or telephone cords, loose switches or plugs, and loose connections in winding posts. The latter two were comparatively easy of discovery, but the first-named otherwise. A perfectly satisfactory switch had not yet been invented. The single wire was better than a multiple cord. Another fertile source of complaint regarding cut-offs was the failure of parties using the telephone to ring for disconnection when through with the wire, or when anticipating a long wait.

After discussion of Mr. Haskins' paper, Professor Carhart, of the Northwestern University, read an abstract of a paper on "Somatic Physics," written by Dr. Clevenger, who was unable to attend, having been suddenly and unexpectedly obliged to leave the city.

At the conclusion of the reading of this paper, a committee on the nomination of officers for the ensuing year was appointed, which appointment, with their report and its adoption, was noted in the report previously published.

Professor Carhart next read an original paper on the "Chemical Action of the Fitch Battery," illustrating the subject on the blackboard. The paper was scientific and instructive, and much discussion ensued.

The next paper read was by Mr. C. H. Wilson, on "The Use of Large Telegraph Wires." The arguments adduced by the author showed that the employment of large gauge wires for the quadruplex circuit was an advantage. A No. 4 wire, recently laid between New York and St. Louis, was giving entire satisfaction. The question had been raised whether, in the desire to increase the conductivity of the wires, there was any limit to their size. There was a limit, and the conductivity could be increased by employing different conductors—copper instead of iron wire, for instance.

In a discussion which followed, Mr. S. mers advocated the use of large wires, and said that their employment had simplified the quadruplex problem.

Mr. M. G. Kellogg having proposed that the next meeting should take place in New York, he was replied to by Mr. E. B. Chandler, who vigorously but quietly opposed such a step. There was nothing as yet in any outside place to attract the members of the Society, while here, the home of the organization, were the rooms and library.

Mr. Kellogg thought, as they were a national society, they should, by holding their meetings outside of Chicago, endeavor to extend the organization.

The Eastern brethren had shown a desire to co-operate with them, and many papers in their *Journal* were from the pens of Eastern electricians.

After further discussion a motion offered by Mr. C. H. Wilson to the effect that, when the meeting adjourned, it should adjourn to reassemble the second Wednesday in June, or at the call of the President, prevailed.

This action will prevent the directors from deciding the time and place of the next meeting until after the date mentioned.

Incandescent Electric Lights.

At the fall meeting of the National Academy of Sciences, at the new building of Columbia College, Nov 16th. Professor Morton, of the Stevens Institute of Technology read a very interesting paper on Electric Lights and on the Measurement of new forms of electric lamps operating by incandescence.

Professor Morton's first paper treated of some recent experiments made by him in determining the electro-motive force of the Brush dynamo-electric machine. Various instruments for the accurate measurement of electric currents of great strength

were first described, and then the measurements of potential in the above-mentioned machine. These showed that each pair of coils on the armature of the machine developed a fluctuating electro-motive force, the projection of which gave a kind of oval curve around the centre of the diagram.

When these curves for each pair of coils are combined, it is found, Professor Morton said, that they show a kind of eight-lobed figure with intersecting lines in certain places. These intersections, if compared with the positions of the commutator, are found to coincide exactly with the points at which rupture of circuit occurs, and thus show that each pair of coils is thrown out, not at the point where its force is least, but at that at which its electro-motive force is equal to that from which it breaks: thus suppressing a spark, but only at a certain sacrifice of theoretical efficiency.

Professor Morton also read a paper on the measurement of new forms of electric lamps operating by incandescence. After explaining his method of measurement, he gave the results of a number of experiments which he had recently made with the new Maxim lamp. In this lamp a filament of any carbonizable substance, such as paper or card, is placed in a globe. The globe is exhausted of air to a certain point and filled with the vapor of gasoline. The electric current is then passed through the globe. By a singular law, the decomposed gasoline becomes deposited upon the filament at the point where it is weakest and is carbonized there. This carbon finally becomes of the same conductivity with the rest of the filament, when the action of the intense heat seeks out the next weakest point of the filament, and this process is repeated indefinitely. This property of self-correction, Professor Morton said, was of great importance. The capacity of the lamp for developing light is remarkable. One of these lamps, employing a power of 40 candles, was run to 240 candles per horse-power; another of 52 candles, in reference to power, was run to 336 candles per horse power; another of 12 candles was run to 136 candles per horse-power. This latter lamp, with the power increased to 49 candles, was run to 426 candles per horse-power, and with the power of 98 candles was run to 607 candles per horse-power. This was far within what the lamp would stand. It could be run to 250 candle-power and, it is said, it has been run to 1,500 candles per horse-power. The law has been discovered of the increase of efficiency with the increase of the intensity of action. It has also been found that the resistance decreased with the increase of temperature.

Professor Gibbs expressed much astonishment at the results obtained by Professor Morton, and said that nobody had dreamed that the light of incandescence could compete with the light of the arc. Professor Morton explained that his references to horse-power had been to the power in the electric current, measured in the usual way, and not to the power in the machine. He added that he would greatly like to compare the Maxim lamp with Edison's latest lamps provided with filaments of bamboo cane. By an accident to his apparatus Mr. Edison has not been able to redeem a promise to send Professor Morton one of his lamps, but Mr. Edison had written him to the effect that his latest lamps with 16 candle power had been run to 55 candles per horse power, as against 120 candles per horse power in his horseshoe carbon lamp. This result compared with the result obtained with the Maxim lamp as 155 to 240.

Professor Barker said that he was much interested in the Edison and the incandescent lamps, and that the statements made by Professor Morton certainly marked a year of great progress in electric

lighting. One of the greatest difficulties had been in making a fibre that would not disintegrate. A bamboo fibre at fifty candle power lasted about an hour. The lamp of Mr. Maxim was a great step in advance, it practically caused the fibre to last indefinitely. He understood that Mr. Edison had recently been working in the same direction.

Electric Signals for Railroad.—Successful Operation of the Union Electric Signal Company's Apparatus.

THE electric signal for railroads is no new invention, but of late it has been greatly improved. The improvements in the Union electric signal over any other safety signal yet adopted were shown yesterday upon the section of the Eastern road, below Salem, where it is now in use. It seems to be especially valuable from its extreme simplicity, and the more important fact that but one wire is used, thus making it safer, more reliable and less expensive. It only requires a single cell of the gravity battery to operate all the signals reliably through a mile section of track, and this arrangement may enable almost any road to place the cell in a switchman's house so that there can be possibly no danger of freezing in the coldest weather. The rails being connected by a wire fastened to a pin and firmly driven into the rail a few inches from the joint, makes a perfect and constant rail circuit system, and any breakage of the current, by moving a switch, breaking of a rail or laying a rail across the track, will instantly set the danger-signal and prevent derailment or collision. There is also an overlapping system, by which the train, as it enters a section, sets the danger signal in front of the engineer, so that he may know that it is in operation. After passing on to the third section, at least 1,400 feet, the engine reaches a relay signal that at once releases the first danger signal, thus practically keeping one whole section behind unoccupied, and if by any cause a car breaks away and remains standing upon a section, the danger signal remains set behind, so that it is impossible for a collision to occur. The usual attachments of crossing, warning and station bells are used. By this arrangement the bell rings when the train enters the section, and stops ringing when it stops at the station. To these admirable arrangements for safety can be added an interlocking switch system that would seem sure to prevent collisions no matter whether the switchman was forgetful or whether the switch was criminally tampered with. By an ingenious and at the same time plain and practical piece of mechanism, the switch is so locked that when a train is upon the section moving in either direction the switch bar remains immovable; even the destruction of the entire switch frame will not release the bar so that the rails can be moved out of position. When the switch is changed a distant danger signal is set, as also when a draw is opened, and by a little repeater in the switch-house the man in charge knows that that distant signal is operating and he is protected. These are among the most important features of this new system of electric signals, and, devoid of all technical terms, the whole system resolves itself into what may be called a perfect constant circuit system, easily and cheaply maintained, furnishing in all weather a full flow of electricity with a sufficient reserve force for unusual demands, and at the same time, when from any cause whatever the circuit is broken, a danger signal is at once set and remains set until the circuit is closed. This system can be managed by hand also. It has been tested and is now in use on the Fitchburg, Old Colony, Pennsylvania Central, Michigan Central, Chicago, Burlington and Quincy and other

western roads, and everywhere gives perfect satisfaction, as it works just as well in snow and ice as in the heat of summer. A party consisting of some newspaper men, President Phillips of the Eastern road and some of his subordinates; J. Gardner Sanderson, general manager of the signal company, Oscar Gassett, superintendent; Mr. Bates, foreman, and several railroad men yesterday rode to the section between Salem and Beverly, witnessed the practical operation of the signal, and examined the system carefully. Upon the return trip a visit was made to the Eastern railroad car-shops at Salem, and upon reaching Boston, the shop of the signal company was visited, and a model of the whole mechanism was inspected.—*The Boston Daily Globe.*

Growth of Inventions.

"CONFOUND those ancients, they always get hold of one's best ideas." As it has been found in literature so in science, and the disappointed inventor, tumbling for the twentieth time over an anticipation of his cherished scheme, is tempted to redeclare that there is nothing "new under the sun," and that all is vanity and vexation of spirit. We give a few interesting examples of clear theoretical, if unpracticable, anticipations of a notable modern discovery.

Professor Stanley Jevons, ten years ago, found allusions to a magnetic telegraph running through many scientific or quasi-scientific works of the sixteenth and seventeenth centuries. The poet Addison speaks of "a chimerical correspondence between two friends by the help of a loadstone." Sir Thomas Browne, in his "Pseudodoxia Epidemica," says: "The conceit is excellent, and if the effect would follow, somewhat divine;" and he speaks of it as a conceit "whispered thorow the world with some attention, credulous and vulgar auditors really believing it, and more judicious and distinctive heads not altogether 'rejecting it.'" Sir Thomas, it would seem, submitted the matter to experiment, but found that although the needles were separated but half a span, when one was moved the other would stand like Hercules' pillars. Joseph Granville, in his "Soepris Scientifica" (1665), discusses the objections of Sir Thomas Browne, and concludes that there are some hints in natural operation that give us probability that is feasible." Glanvill, more than two hundred years ago, said: "Though this pretty contrivance possibly may not yet answer the expectation of inquisitive experiment, yet 'tis no despicable item that by some other such way of magnetic efficiency it may hereafter with success be attempted, when magical history shall be enlarged by riper inspections; and 'tis not unlikely but that present discoveries might be improved to the performance." The earliest book in which Mr. Jevons found allusions to a magnetic telegraph is the "Natural Magic" of Baptista Porta, published in 1589. In the seventh book he describes the "wonders of the magnet," saying in the preface, "I do not fear that with a long absent friend, even though he be confined by prison walls, we can communicate what we wish by means of two compass needles circumscribed with an alphabet." In the eighteenth chapter of the same book he describes the experiment of putting a magnet under a table, and moving there by a needle above the table. This experiment, as Porta remarks, was known to St. Augustine, and an exact description will be found in his "De Civitate Dei," a work believed to have been begun A. D. 413. It seems probable that this passage in St. Augustine suggested the notion either to Porta, Bembo, or some early Italian writer, and that thus it came to be, as Sir Thomas Browne says, "whispered thorow the world." Mr. William E. A. Axon refers to the passage in Strada, in which he supposes the load-

stone to have such virtue that "if two needles be touched with it, and then balanced on separate pivots, and the one be turned in a particular direction, the other will sympathetically move parallel to it. He then directs each of these needles to be poised and mounted on a dial having the letters of the alphabet arranged around it. Accordingly, if one person has one of the dials and another the other, by a little prearrangement as to details, a correspondence can be maintained between them at any distance by simply pointing the needles to the letters of the required words."—*Design and Work.*

The Photophone.

At the meeting of the Physical Society, in London, Nov. 27th, Professor Graham Bell exhibited his photophone, and explained the apparatus employed by Mr. Sumner Taintor and himself for transmitting sounds by a beam of light. The form in use consists of a metal plate or mirror vibrated by the sound, and reflecting a beam of light to a distance, where it is focussed in a selenium cell in circuit with a telephone and battery. The light undulates in sympathy with the vibrations of sound, and alters the resistance of the selenium in accordance with the vibrations, thereby reproducing the sound in the telephone. The electric light used was too unsteady to give articulate speech, but by means of a rotating disc, perforated round its rim with holes, the light could be occulted in such a manner as to give an audible note in the telephone. Different varieties of receivers were described, some of which have not yet been tried. One of these consisted in varying the rotation of the plain of polarization of the polarized beam. Another plan for transmitting the beam consists in making the vibrating plate vary the supply of gas to a jet or manometric flame. The furthest distance speech has been heard by photophone is 800 feet, but, theoretically, it should operate better the greater the distance between the mirror and selenium. On interposing a sheet of hard rubber in the ray the invisible rays passing through it convey the sounds in a lower degree, and sounds can be heard by replacing the selenium receiver by discs of different materials, such as hard rubber, metal, etc., and simply listening at them. All substances appear to possess the power of becoming sonorous under the influence of varying light. Hard rubber, antimony, zinc, give the best effects; paper, glass, carbon the worst. Even tobacco smoke in a glass test tube, held in the beam emitted a note, as also did crystals of sulphate of copper. When hard rubber was simply made into the form of an ear tube and held in the beam, the audible effect was also produced; and, in fact, when the beam was focussed in the beam itself without any other appliance whatever, a distinct sound could be perceived.

Mr. Shelford Bidwell also exhibited a lecture photophone, in which the reflector for receiving the light was discarded, and the beam focussed in the selenium by a lens. The two lenses used cost only 25s., and the beam was sent 14 feet. The selenium cell was made by spreading melted selenium over sheets of mica, and then crystalizing it by heat. For mica Professor Bell recommended microscopic glass. The resistance of the cell was 14,000 ohms in the dark, and 6,500 in the light. Speech was distinctly transmitted by this apparatus. Mr. J. Spiller thought that since selenium was probably alloyed with brass and the baser metals, it would be better to use gold and silver for the cells; but Professor Bell said that he preferred brass, since, (perhaps for the reason Mr. Spiller gave) it yielded the best results.—*The Electrician.*

Journal of the Telegraph.

PUBLISHED SEMI-MONTHLY AT 135 BROADWAY.

J. N. ASHLEY,

EDITOR.

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NEW YORK, JANUARY 1, 1881.

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VOL. XIV.

THE FOURTEENTH VOLUME

OF THE

JOURNAL OF THE TELEGRAPH

WILL COMMENCE WITH THE NUMBER FOR

January 1, 1881.

THE constantly increasing favor with which the JOURNAL OF THE TELEGRAPH has been received for more than THIRTEEN YEARS has demonstrated its value and usefulness.

It is generally recognized in this and other countries as an authority on *Electrical Science* as applied to *Telegraphy* and the *Telegraphic Art*.

Its columns are enriched by contributions from able Electricians and Telegraphists, and writers upon electrical science and telegraphic subjects.

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To advertisers it offers advantages which cannot be elsewhere obtained. Its present circulation is about 10,500, and is constantly increasing. It is received and read by telegraph and railway proprietors, superintendents, managers and employes generally, in all sections of the United States and the Dominion of Canada, and has besides a considerable and increasing European circulation.

For Subscriptions for the new volume is offered the following

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J. N. ASHLEY Editor

P. O. Box 3393, New York.

A New District Constituted.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY.
New York, Dec. 28th, 1880.

Executive Order No. 191.

1. With the exception of the lines on the Missouri Kansas and Texas R. R., all the lines in Texas, including the line between Marshall, Texas, and the Mississippi River via Shreveport and Monroe, La., are hereby constituted a new district, designated as the Fifth District of the Southern Division.

2. Glynn M. Baker is hereby appointed Superintendent of the Fifth District of the Southern Division, with head-quarters at Dallas, Texas.

NORVIN GREEN,
President.

THE TELEPHONE IN GREAT BRITAIN A GOVERNMENT MONOPOLY.

OUR British friends are frequently restive under the monopoly of the telegraph exercised by the government, and there are not wanting parties who contend that the public would be better served had the telegraphs continued under private management. Heretofore the telephone service has been conducted independently of Post-office control. Until within the last year the use of the telephone in the United Kingdom was comparatively limited, but its merits and advantages having become better known and appreciated, several companies have been organized for its general introduction, which have met with much success, and the business seemed likely to be profitable. At this point the postal authorities, who had hitherto regarded the telephone with comparative indifference, and had made no efforts to establish it as a branch of the telegraphic service, became suddenly aroused to a realization of the fact that it was included in the government telegraph monopoly created by the act of Parliament known as the Telegraph Act. Accordingly an action was commenced by the Attorney-General against the Edison Telephone Company, of London, which had established telephone exchanges and were acquiring a large and profitable business. The case was recently heard and a decision rendered in favor of the government. Under this decision the telephone service under other than government control and management is declared to be illegal. The defendants have given notice of their intention to appeal from this decision, but there seems to us to be but little chance for its reversal; in the meantime, however, arrangements have been made by which the existing telephone enterprises will continue their operations.

The decision in favor of the Government has not been very favorably received by the press or the public, as the business is not likely to be satisfactorily conducted under the necessarily strict and rigid rules and regulations of a government service, but as the law stands there seems to be no escape from the logical result. It was understood before this decision was rendered, that, if in his favor, the Postmaster-General was prepared to make favorable terms with the companies for the continuance of their business. This statement was probably unauthor-

ized, as since, that official has given notice that he was prepared to supply telephonic service wherever it was required. The Edison Telephone Company has replied to this with a notice to the Postmaster-General and the public that it owns exclusive patent rights in telephones, and that if these are infringed, legal proceedings will be immediately commenced against infringers.

This was the position in which matters stood at the last advices. The dissatisfaction of the public at the transfer of the telephone service to the government is so marked, and in view of the fact that when the Telegraph Act was adopted the telephone as a practicable means of telegraphic communication had not been thought of, a supplementary act, exempting the telephone service from the government monopoly, may possibly meet with favor. We should think an agitation in favor of such legislative action, on the part of the press and the telephone companies, would be more advisable and advantageous than the expenditure of money in what seems to us to be a hopeless legal contest.

Editorial Notes.

In Great Britain small boys who amuse themselves by stoning telegraph insulators do not escape the consequences as easily as in this country. At the Nuneaton Petty Sessions recently four little boys charged with damaging insulators used in connection with the telegraph wires belonging to the London and Northwestern Railway, were each sentenced to receive six strokes with a birch rod. Served them right.

The dinner given by Boston Merchants to the messenger boys of the Western Union Telegraph Company in that city was a deserved and gratifying recognition of their services. The part taken by these messengers in the telegraphic service, although a subordinate, is an important one, as upon their faithful and prompt performance of their duties its usefulness and success depend in no small degree. The evidence afforded these Boston boys that their services are appreciated will no doubt prove most beneficial, and will incite them to even greater efforts to give satisfaction to the patrons of the Company.

The railroads of the country are doing an enormous business, exceeding largely anything ever before known. Without the assistance afforded by the telegraph it would be utterly impossible for them to do this amount of business, and the chances for accidents and collisions would be largely increased. In addition to the regular telegraph facilities, the railroads may be further protected by a reliable system of automatic electrical signals, which also facilitate the movement of trains over crowded tracks, as would otherwise be impossible. This fact is becoming appreciated by railroad managers, as is shown by the rapidly increasing business of the Union Electric Signal Company of Boston. We print in another column a description of its system, and an account of an exhibition of their operation given to a party of railroad managers and others on the Eas

tern Railroad of Massachusetts, said to have been entirely successful; which will be of special interest to those who are concerned in practical railroad management.

The business and social relations between this country and Mexico are constantly becoming more intimate and important. The telegraph cable about to be laid between Vera Cruz and the Rio Grande will assist materially in facilitating the development of these relations. The resources of Mexico are enormous, and now that the Republic has been, by wise political management, relieved of the revolutions and political disturbances which have hitherto retarded their development, and is being brought into closer relationship with the United States, her future progress will be likely to exceed even the most sanguine anticipations of those engaged in the work, already progressing so favorably.

The Telegraphers' Mutual Benefit Association—Acknowledgement of Payments.

HERETOFORE payments of assessments by members of the Telegraphers' Mutual Benefit Association have been acknowledged through the JOURNAL OF THE TELEGRAPH by the numbers of the certificates. When the membership was comparatively small this was easily done, but it has now become so large that it is a matter of too much labor and difficulty to be continued. The Executive Committee have therefore decided to make a change, which members will do well to note.

Hereafter the numbers of the certificates upon which payment has not been received by the secretary will be printed in the JOURNAL OF THE TELEGRAPH of the 16th of the month following that in which the assessment is made. For instance, upon assessment No. 136, issued December 1st, 1880, the numbers of certificates liable to that assessment, payment on which has not been made to the secretary, will be printed in the issue of this paper for the 16th inst.

Agents are requested to forward all collections made by them, so that they will be received by the secretary not later than the 14th of each month, in order that the list may be as nearly correct as possible. In cases where payment has been made to an agent, the holder of a certificate is protected by his receipt even though the number of the certificate may appear in the list as delinquent.

In this connection we would call the attention of members to the necessity of promptly paying assessments upon receipt of notice that they are due. Not unfrequently, membership is lost by dilatoriness and carelessness in this respect, and in some cases restoration is impossible either on account of the limits of age having been passed, or an unfavorable physical condition.

The Case of John G. Boyce.

WITH assessment No. 137 there will be sent to each member of the Telegraphers' Mutual Benefit Association a brief statement of the circumstances under which the claim of the beneficiary of John G. Boyce,

was rejected by the Executive Committee. It will be remembered that the action of the committee was sustained at the annual meeting of the Association in 1878 and again in 1879. Many members of the Association, however, feel that, notwithstanding, relief should be extended to his wife and children, who are in need of pecuniary assistance. Voluntary contributions are therefore solicited from the members to a fund for that purpose, to be remitted with the amount of the assessment to the agents, who will forward the same to the Secretary. While these contributions will be voluntary, it is hoped that in consideration of the circumstances, and of the needs of the wife and children of a deceased telegraphist, there will be a generous response to the appeal made in their behalf.

A New Year.

THE history of 1880 is made up and to-day we commence a new year. What it may have in store for us of joy or sorrow, of success or adversity, we shall learn in due season, but most of us will begin it hopeful and confident; a hopefulness and confidence which we sincerely wish may be realized.

THE past year more than realized the anticipations of prosperity with which it was greeted, a prosperity in which telegraphs and telegraphers have fully shared. The year before us seems not less promising, but as it is impossible to certainly forecast the future, we will await patiently the development of what it may bring to us.

We hope that our readers generally have enjoyed the holiday season which now closes, and will resume their labors for the coming year with vigor and energy renewed; and that when it has passed, we may look back upon it with pleasant recollections; or, if sorrow and misfortune must come, we may be conscious that it has not been from our own acts or faults that we have been subjected to trials which might have been avoided.

Correction.

In the article on "Atmospheric Electricity" in the last number the word "exaggeration" in the 25th, line of the third column, first page, should be *aggregation*.

Title Page for Volume XIII.

THE title page for Vol. XIII was sent out with the last number of that volume. Should it fail to be received in any case, a duplicate will be forwarded on application to us.

The Telegraph.

INTERNATIONAL OCEAN TELEGRAPH COMPANY.

Election of Directors and Officers.

At the annual meeting of the stockholders of the International Ocean Telegraph Company, held Dec. 7th, the following directors for the ensuing year were elected: Dr. Norvin Green, Messrs. Augustus Schell, Samuel F. Barger, Moses Taylor, E. S. Sanford, Har-

ison Durkee, R. H. Rochester, Robert C. Livingston, Dr. J. O. Green.

At a Meeting of the board of directors, Dec. 11th, the following officers of the Company were elected for the ensuing year:

Norvin Green, *President*

J. O. Green, *Vice-President*.

James R. Beard, *Secretary*.

Messrs. Schell, Barger and Livingston, *Executive Committee*.

Congress and the Telegraph.

In the United States Senate, December 14th, Mr. Morrill, of Vermont, offered a resolution instructing the Committee on Post Offices and Post Roads to enquire whether or not the existing telegraph lines largely interfere with the business of the Post Office Department, and whether telegraphic service should not be placed in the hands of the General Government; which was adopted.

The Civilization of Africa by Telegraph.

M. DE LESSEPS has a plan for the civilization of Africa by telegraph. Stations for entertainments and for scientific purposes are to be established at points between the coast and the interior. Thus a party has already arrived in the Oussagura to establish a station to be connected with Zanzibar, and another party has been commissioned to establish a station on the Ogove River to be connected with the French Colony at the Gaboon. The stations are to be connected by telegraphic wires, the planting of which will be preliminary to the building of railways, so that these wires, says M. de Lesseps, will become for Africa, as they were across our Western Plains, and are for Australia and for the Russians in Central Asia, real conductors of civilization.—*Notes in Popular Science Monthly for January.*

The Exchange Telegraph Company of London.

THE Exchange Telegraph Company, of London, was the first to introduce in England the system of reporting quotations and sales of the Stock Exchange so successful in this country. *The Electrician* gives some interesting statements in regard to the system as operated in London. It states that the electrical and mechanical arrangements which are under the control and management of Mr. F. Higgins, electrician to the company, display an amount of mechanical skill in their organization which does the greatest credit to the inventors as well as to Mr. Higgins, who has greatly improved on the original instruments.

There are two central offices, one at 17 and 18, Cornhill, and the other at 8, Picadilly. From these radiate forty circuits from Cornhill, and twenty from Picadilly, and the two offices are connected by five wires.

The Exchange Company work under licence from the post-office, being bound not to carry their circuits more than one mile from each of their two stations. The lines used, consist of about fifty miles of underground wires rented from the post-office, and seventy miles of overhead wires belonging to the company.

The Exchange Company have also a system of fire calls, which is rented and worked by the Metropolitan Fire Brigade. The Company have also in operation a "call system" similar to the district telegraph system used in this country.

The exchange system is largely used now, says *The Electrician*, by stockbrokers principally, and will, no doubt, continue to extend; but it is curious that the system and custom of doing business

amongst brokers in Manchester, Liverpool and Glasgow, though differing in each town, is such that the exchange system is still only of use in London as regards brokers' work.

The Telephone in Switzerland.

The *Journal Télégraphique* states that the Swiss Telegraph Administration has decided to grant no more concessions for telephonic systems in towns, but to establish and construct them in future itself. According to late information the Federal Council has determined to establish a telephone service in the chief towns of the Confederation. The terms of subscription will be £8 a year.—*The Electrician*.

The Telephone Service Decided to be a Government Monopoly in England.

In the case of the Government against the Telephone Companies, recently tried in London, Justice Stephens delivered judgment Dec. 20th, ult., against the Edison Telephone Company, holding that telephones are telegraphs within the meaning of the Telegraph Act.

The case was brought in the Exchequer Division by the Attorney-General to compel the defendants to take out a license to use the telephone, on the ground that it is an infringement of the government monopoly in regard to telegraphs. Mr. Justice Stephen cited the wording of the acts of Parliament under which the government acquired the telegraphic monopoly, and said the definition of a telegraph contained therein, it seemed, included any apparatus used for the purpose of transmitting messages by means of wire. The Court, he said, fully admitted the novelty and value of the telephone. Though it might be necessary for scientific purposes to distinguish between it and the telegraph, it seemed to him the definition of the latter in the acts of Parliament was wide enough to cover any instrument that might be invented which employed electricity transmitted by wire as a means of conveying information. The defendants were therefore liable on the information for infringing the privileges of the Postmaster-General. The judgment accordingly was for the Crown, with costs. Mr. Webster, counsel for the defendants, asked that judgment be stayed pending an appeal. It was eventually arranged that the order of the Court should contain terms allowing the telephone company to continue its operations. It is to be remarked that various newspapers, since the institution of the proceedings, have stated that the government, in the event of a decision in its favor, intended to deal liberally with the telephone companies.

Government Aid for a Pacific Cable suggested.

The final session of the Forty Sixth Congress commenced at Washington on Monday the 6th inst. In his annual message to Congress the President suggests the consideration of the necessity of extending Government aid to a Pacific telegraph cable. He says:—

In this connection I desire also to suggest the very great service which might be expected in enlarging and facilitating our commerce on the Pacific Ocean, were a transmarine cable laid from San Francisco to the Sandwich Islands, and thence to Japan at the north and Australia at the south. The great influence of such means of communication on these routes of navigation, in developing and securing the due share of our Pacific coast in the commerce of the world, needs no illustration or enforcement. It may be that such an enterprise useful and in the end profitable as it would prove to private investment, may need to be accelerated by prudent legislation by Congress in its aid, and I submit the matter to your careful consideration.

Telegraphic Notes.

The new cable telegraph system in the Gulf of St. Lawrence has already resulted in the saving of one vessel and two shipwrecked crews. The telegraph line on the Magdalen Islands has been completed, and 140 miles of poles have been placed on Anticosti. It is expected that the line on this island will be finished by July next.

TELEGRAPHIC communication has been established between St. John, N. B., and the Island of Grand Manan.

The American District Telegraph Company of this city, delivered the day before Christmas, 12,188 messages—which exceeded by 1,403 the business on the corresponding day last year. The messenger earnings were \$2,040 against \$1,911 last year.

The American Bell Telephone Company has declared a dividend of 3 per cent., payable on and after January 1st.

There are now over 300 telephone exchanges in operation in this country.

The British Postal Telephone Monopoly.

The General Post Office has issued a notice stating that it is prepared to establish in any town telephonic intercommunication, at the same time holding itself ready to make arrangements for the establishment or continuance of systems of intercommunication introduced by existing private companies. The *Times* in an editorial article on the telephonic case—which was decided yesterday against the Edison Company—says "On all the technical questions at issue the government is so obviously right that it is difficult to conceive on what grounds the company intend to rest their appeal. For all practical purposes the controversy may be considered to be decided. Postmaster-General Fawcett may be trusted to use the monopoly with the least possible injury to the public; still it may be confidently predicted, that if telephonic communication be suffered to fall under the control of the General Post Office it will not only be enhanced in cost but will languish as a scientific discovery. The decisions of the courts on the subject should be submitted to the revision of Parliament. It might be the better policy to at once write off the purchase of telegraphs at a loss, rather than to increase the cost of communication by seeking to include the telephone in the bargain."

The Edison Telephone Company, of London, as an answer to the above offer of the Postmaster-General, advertised that it has exclusive patent telephone rights, and will proceed against him for any infringement of those rights.

The Congress of Electricians.

THE several Governments of the States comprised within the Telegraphic Union have already received diplomatic invitations to take part in the Congress and Exhibition at Paris next year.—*Journal Télégraphique*.

Foreign Telegraphic Notes.

THE telegraph cable between Monte Video and Rio Grande do Sul, South America, has been repaired.

It is understood that the Japanese Government intend to lay a telegraph cable between Nagasaki and Fusan.

An aerial telegraph line is about to be erected between Paris and Lisbon, in order to facilitate communication between North Western Europe and South America.

A Calcutta despatch to the *London Times* says: "During the recent visit of the Viceroy of India to

Bombay an important deputation protested against the Government's refusal to permit the establishment by a private company of a system of telephonic exchanges in the great cities of India. Mr. Gibbs, a member of the Council, received the deputation and pointed out the necessity of maintaining the Government's monopoly of the telegraphs, but, in view of fresh arguments, he promised a reconsideration of the question."

The report of "Her Majesty's High Commissioner," in the island of Cyprus, states that, "contrary to my expectations, the telegraph is being used by the public far more than I thought it would."

British India had in 1879 18,589 miles of telegraph line, 44,470 miles of wire and 108 miles of telegraph cable, over which 1,379,312 messages were transmitted, exclusive of "service" messages.

On Dec. 1st last, the rates by the new French Atlantic Company's cable were assimilated to those of the Anglo and Direct Cables.

According to a table published by the *Journal Télégraphique* there were in 1879 1,471 telephones in use in Germany.

The Silvertown Company's steamship *Ducia* was to leave Silvertown, Dec. 7th, with the first portion of the new Mexican cable, and was to be followed by the steamship *International* with the remaining portion about Dec. 15th.

Arrangements are being made to put the Cape Observatory into telegraphic connection with that at Aden for astronomical purposes.

A circuit telegraph around the island of Jamaica is expected to be completed this month.

New Westminster is in future to be the headquarters of the British Columbia telegraphs.

The steamship *Edinburgh*, lately used by the Telegraph Construction and Maintenance Company as a cable ship, has been sold, and is intended to be used in future as a cattle ship.

The Supreme Government of India have declined for the present to reduce the cost of inland telegraph messages. A rupee is charged for every six words, and, looking at the expense of establishing and maintaining telegraphs in India, the government say that they are not prepared to adopt any revision of the tariff the effect of which would be to burden the general revenues in order that the senders of messages might be enabled to transmit them at a lower rate than the cost price.

Orders have been given to the police of the German Empire to prevent the establishment of telephonic communications by others than the Government, who reserve all telegraphic rights.

The Government of India have requested the Indian Chamber of Commerce to furnish their opinions as to the inauguration of the telephone system in India. This request is based on the application of the Bell Telephone Company for permission to work the Edison and Bell system in India.

Miscellaneous.

A PLEASANT CHRISTMAS ENTERTAINMENT.

A PLEASANT feature of Christmas festivities in Boston, Mass., was a dinner given to the messenger boys of the Western Union Telegraph Company through the kindness of the merchants of that city. About one hundred of the messengers attended, and the dinner was served at a restaurant on Bulfinch street. One detachment of the boys sat down at 11:30 A. M. and the other at 1:30 P. M. At the conclusion of the dinner, addresses were made by Mr. Twitchell, manager of the delivery department, Capt. Tarleton, who has outside charge of the boys, and Mr. William Martin, who has been a receiver in the office for

the past thirty years. Letters of regret for unavoidable absence were received from Mr. Charles F. Wood-superintendent; Mr. George F. Milliken, manager; and a congratulatory despatch was received from the clerks and messengers in New York City. The boys passed a vote of thanks to those who had contributed to their enjoyment.

[From *The Electrician*.]

The Laying of Submarine Telegraph Cables.

By J. MUNN, C. E.

THE laying of a submarine cable has been reduced to a science. The arrangements on board a telegraph ship are now in the main everywhere the same. The cable is usually laid under the entire responsibility of the contractors who make it. To them belongs the ship, and all the operations of laying are conducted by them, subject to the approval of a staff of engineers, representing the company's interests, who are temporary guests on board. The head of the expedition is the engineer-in-chief, who directs, by aid of his assistants, the mechanical operations of laying. Under him are the chief electricians, whose duty is to see that the cable is laid in good electrical condition, and the captain of the ship, whose office is simply to manœuvre the ship in accordance with the requirements of laying. A fully equipped telegraph ship must be fitted with the necessary machinery for carrying and laying the cable with proper electrical apparatus for testing it, and also with the most approved means of navigation; for it is of the utmost importance in case of future repairs to be able to lay down on a chart the exact course of the ship, since this is also the exact route and position of the cable. Besides her cable tanks she has also force pumps for filling seawater into them or drawing it off; she has a huge laying machine, consisting of a friction brake, strain dynamometer and drum; she has a powerful steam winch for coiling over cable from one tank to another; and in addition to these she has a store of grapnels for hooking the cable in the sea, and buoys for marking positions or buoying the end up at the surface when it becomes necessary to do so. Projecting from the stern there is projected a large deeply-grooved wheel or pulley of iron which revolves on a fixed axle, and is generally surrounded by a narrow platform with a railing round it. This is the "stern sheave" or pulley over which the cable passes on its way to the sea; and this, as well as the red-painted buoys lashed along the taffrail, is one of the distinguishing features of a cable steamer.

Personal.

MR. JOSEPH B. STEARNS, the well-known inventor of the duplex telegraph system, after several years' absence in Europe, has arrived at Boston, Mass. He comes to superintend the laying of the New Mexican telegraph cable.

Mr. Henry W. Pope has resigned the position of General Superintendent of the Metropolitan Telephone and Telegraph Company of this city to accept the office of Vice-President and General Manager of the Mutual District Telegraph Company, a new district telegraph enterprise.

Mr. Cyrus W. Field arrived at Hong Kong, on his tour around the world, Friday, December 24th, and telegraphs, "All well, so far."

Ogden, Utah, is the first city west of the Mississippi River to adopt the electric light.

Arrangements are being made to put the Cape Observatory in telegraphic connection with that at Aden for astronomical purposes.

The Photophone.

As anticipated the publication of the working details of Professor Bell's photophone has soon resulted in their repetition by English experimentalists. In *Nature* Mr. Sheldford Bidwell describes an arrangement which in his hands has been very successful. The most difficult part is in the construction of the essential selenium cell, for which only a few grains of the expensive selenium are necessary. Using the limelight, and at a short distance, Mr. Bidwell finds the articulation, although not perfect, far better than might be expected, ordinary colloquial phrases being readily understood. The loudness of the reproduced speed varies in a remarkable manner from that of an ordinary telephone to faint audibility, and this may occur several times in a single sentence.

Gen. Hazen Appointed Chief Signal Officer U. S. A.

GEN. WM. B. HAZEN has been appointed chief signal officer U. S. A., to fill the vacancy caused by the death of Gen. Myers.

Gen. Hazen is a graduate of West Point, and was appointed Brevet Second Lieutenant of Infantry July 1, 1855, and was for gallant conduct and meritorious services successively promoted, and was made Major-General by Brevet March 13, 1865, and commissioned Major-General of Volunteers April 20, 1865, to rank from December 13, 1864, and was mustered out of the volunteer service Jan. 15, 1866. He was subsequently assigned to duty as Colonel of the Thirty Eight Infantry July 28, 1866; and transferred to the Sixth Infantry March 15, 1869.

Telephoning Santa Claus.

YESTERDAY, says the *Manchester Union*, a call was received at the central station from Mr. E. M. Slayton's residence, and, on the return inquiry from the station as to who was wanted, Mr. Slayton's little girl, a tot about four or five years, halloed: "Connect Mr. Slayton's house with Santa Claus." "What?" said the central operator. "Is this Santa Claus?" came over the magic wire. "No, this is the central office," was sent back. "Hasn't Santa Claus got a telephone?" was the anxious inquiry from the little telephoner. "No, his isn't put in yet." "All right, good by," was the final response coming in a very disappointed tone of voice, and the scene closes.

A New Property of Selenium.

A HITHERTO unobserved property of selenium has, according to *Engineering*, been announced by M. Blondlot to the French Academy of Science. This investigator finds that when a piece of annealed selenium is connected to one pole of a Lippmann capillary electrometer, by means of a platinum wire, and a plate of platinum is similarly connected to the other pole, a comparatively powerful electric current is developed by rubbing the selenium against the platinum plate, as is shown by the deflection on the electrometer scale. Mere contact between the selenium and the metal produces no deviation from the zero; but the act of rubbing readily gives an electromotive force equal to that of a sulphate of copper cell. As if to take the effect still further out of the category of those already recognized, M. Blondlot has verified the facts that neither the rubbing of two metals against each other, nor an isolating substance against a metal, nor two isolating substances, can produce a change in the capillary electrometer. The current flows through the electrometer from the unrubbed to the rubbed surface of the selenium. Now a thermo-electric current set up by heating a

selenium-platinum junction would, as M. Blondlot points out, flow through the electrometer from the hot selenium surface to the cold one, or in precisely the opposite direction, hence the novel effect cannot be due to heat developed by the friction.

An Electric Hammer.

UNDER the name of "an electric hammer," Messrs Siemens and Halske, of Berlin, have lately patented an arrangement which consists essentially of three coils and a hollow rod of iron or soft steel, which can move to and fro within the coils in the direction of their axis. By means of a constant current of unvarying direction sent through the middle coil, the rod is magnetized; and through the other coils a machine or battery sends alternating currents, by virtue of which the rod is alternately drawn in and thrust out with great rapidity. The motion on one is limited by a spiral spring working an elastic cushion. With a screw arrangement the rod can be worked with the necessary step-by-step rotation in boring rock. When the boring in rock has gone so far that the borer no longer reaches the rock, one of the rod-guiding projections on the upper coil is struck, and this has the effect of displacing all three coils in their stand, wherein they are held fast only by friction.—*English Mechanic*.

Protection of Oil Tanks From Lightning.

MR. A. A. KNUDSON, of Brooklyn, N. Y., has lately perfected and patented a system of protecting oil tanks from lightning, which is approved by several prominent electricians. The invention includes a device for distributing a spray of water over the top of the tank for condensing the rising vapor and cooling the tank; a system of lightning conductors connected with a gutter surrounding the tank, and a hollow earth terminal connected with the gutter by a pipe, and designed to moisten the earth, and at the same time prevent the earth around the terminal from becoming saturated with oil.

This system of protection has been submitted to and approved by Prof. Henry Morton, of the Stevens Institute of Technology, Messrs. F. L. Pope, Elisha Gray and other prominent electricians.

Prof. A. Graham Bell read a paper on his latest discovery, the Photophone, to the Society of Arts, in London, Dec. 1st.

THE TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

P. O. BOX, 3175, NEW YORK.

ASSESSMENT 137.—JANUARY 1ST, 1881.

ANTHONY HEDLEY, died of Chronic Inflammation of the bladder and kidneys, at Albany, N. Y., December 4th, 1880. His Certificate, No. 1,994, was issued April 25th, 1873. One dollar is due to meet this assessment from members holding Certificates numbered up to and including No. 3,909. Insurance expires January 31st, membership, February 2d. J. N. ASHLEY, Secretary.

BORN.

LAMB.—At Round Lake, N. Y., Sunday, December 19, 1880, to E. C. LAMB, Manager Western Union Telegraph, and agent D. & H. C. Co., a son.

McLAUGHLIN.—In New York, December 15th, 1880, to THOMAS F. McLAUGHLIN, night receiver Atlantic and Pacific Telegraph Company, No. 145 Broadway, a son.

MARRIED.

HAMILTON-PARK.—At the residence of the bride's parents, Greenville, Conn., December 15, 1880, by the Rev. L. T. Chamberlain, GEORGE A. HAMILTON, Electrician Western Union Telegraph Company, New York, and Miss NELLIE F. PARK of Greenville.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, January 1, 1880.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

GENERAL INFORMATION.

Commencing with the month of December, managers will enter upon the back of their monthly report, (form No. 4,) the total amount of checks for "this line" and checks for "other lines," for example:

Checks

For "this" line \$

" "other" lines, \$

The above figures should of course correspond with the footings of the columns in the check report headed

"THIS OFFICE CHECKS."

A new form, No. 4, is now in preparation which will contain special columns for "Checks."

ARIZONA.

* Camp Grant (in Tariff Book) is also known as Fort Grant.

ALABAMA.

818 Akron, closed.
285 Gadsden, closed.

BRITISH COLUMBIA.

Victoria is now an other line office. The tariff to Nanaimo, Somers and Victoria from all W. Union offices in the Eastern, Central and Southern divisions is 150 and 10 for "this" line and 50 and 3 for "other" lines, check Laconner, Washington Terr. Nanaimo, Somers and Victoria are now half-rate offices.

On and after January 1st, 1880, the following "other" line offices in British Columbia will be half rate offices:

Barkerville.	Mount Begbie.
Bridge Creek.	Nanaimo.
Burrard Inlet.	New Westminster.
Cashe Creek.	Queenselle.
Chilliwack.	Soda Creek.
Clinton.	Spence's Bridge.
Hope.	Somers.
Langley.	Stanley.
Lytton.	Yale.
Matsqui.	

The minimum charge for "other" lines on a half-rate message to any of the above named places is 25 cents.

CALIFORNIA.

Hereafter the "tariff for other lines" from Virginia City, Nev. to Bodie, Bridgeport, Mono Co. and Coleville (reopened) will be 50 and 3, and are half rate offices. S.

CONNECTICUT.

25 Jewett City, reopened. S.

GEORGIA.

* Tybee, 50 5 by telephone from Savannah. a.

ILLINOIS.

307 Pullman P. O. A. is now care of Pullman Palace Car Co., Kensington, Ill. S.

818 Savoy, given as a new office in JOURNAL of Dec. 16, 1880, should read 818 Savoy. S.

288 South Chicago will hereafter be in Square 307. a.

INDIANA.

299 Evansville, T. H. and Chicago Junction, changed to 299 Otter Creek Junction.

KANSAS.

* Howard City is now a Western Union office, Square 504, S.

MASSACHUSETTS.

21 Pigeon Cove, reopened.

MICHIGAN.

Business for Mackinaw Island, Point Ste. Ignace and Sault Ste. Marie, Mich., will, until further notice, be mailed from Cheboygan.

Notice in JOURNAL of Dec. 16, 1880, changes the name of * Bradley to Garfield; this is incorrect. The notice should have read 230 Bradleys (W. Union office opened in JOURNAL July 16, 1880) changed to 230 Garfield. The "other" line office at Bradley still retains that name.

MINNESOTA.

Hereafter the "tariff for other lines" from Milwaukee, Wis. to Minneapolis and St. Paul will be 50 and 3.

MISSISSIPPI.

The following change in "other" line rates from Greenville, Miss., will take effect at once: S.

* Ben Lomond, 50 3	* Halls Landing, 50 3
* Carolina Landing, 60 4	* Leota, 60 4
* Chotard, 50 3	* Mayersville, 50 3
* Eggs Point, 60 4	* Refuge, 60 4
* Greenville, 60 4	* Skipwith, 50 3

MISSOURI.

369 Etiah, closed. S.

427 Samsel, closed.

NEVADA.

Hereafter the "tariff for other lines" from Virginia City, Nev. to Aurora, Belleville, Marietta and Mountain House will be 50 and 3, and are half-rate offices.

* Bullionville, reopened, 150 and 10 from Salt Lake, Utah.

NEW YORK.

45 Cemetery, now * Cemetery, 35 cents from Albany.
* Fort Ticonderoga, closed.
* Hoosick is now a Western Union office, square 36. S.
* Hopkinton, closed.
* Rogers Book Hotel, closed. S.
West New Brighton is now a W. Union office, tariff same as New Brighton, a.

OHIO.

* Avondale 25 cents by telephone from Cincinnati, and all messages to Avondale must be prepaid. a.

180 Botzums P. O. A. is Buckeye, Summit Co. S.

180 Chippewa Lake, closed.

242 Harrisburg is in Montgomery Co. P. O. A. is Jampton. S.

ONTARIO.

* Fort Whitby, closed.
* Kintail, closed. S.
* Salmonville, reopened.

PENNSYLVANIA.

Hereafter the tariff to Germantown and Frankford will be the same as the rate to Philadelphia.

* Ligonier, 15 1 by telephone from Latrobe. S.
59 Springfield, Berks Co., should read 59 Springfield, Chester Co. S.
47 Woodburne P. O. A. is Oxford Valley, Bucks Co. S.

QUEBEC.

The "tariff for other lines" to Deschambault, Point du Lac Station, St. Basile and Yamachiche is now 40 and 2 from Montreal Junction. S.

* Merlin, closed. S.
* Champlain should read * Champlain. S.
* St. Celestin, closed.

TENNESSEE.

330 Dyer P. O. A. is Dyers Station. a.

WISCONSIN.

Erase "P. O. care Racine" in the "Remarks" column opposite of 297 Western Union Junction.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

ARKANSAS.

439 Eureka Springs.

COLORADO.

557 Plum P. O. A. Sedalia.
559 Starkville.

DAKOTA.

* Casselton (H. R.), 90 6 Milwaukee, Wis., check Chicago, Ill.

INDIANA.

299 Otter Creek Junction.

IOWA.

435 Clarion.
455 Dean City.

416 Norwich.

KANSAS.

476 Madison.

KENTUCKY.

* Calvert City, 50 3 Elizabethtown.

MAINE.

* Dixfield, 35 2 Portland.

MASSACHUSETTS.

* Elmwood, Plymouth Co., 15 cents delivery from East Bridgewater.

* Hanover, 10 cents by telephone, from Rockland.

MISSISSIPPI.

* McKinneysville, 125 10 Vicksburg.

* Terrene, 110 7 Vicksburg.

MISSOURI.

398 Elliott.

NEBRASKA.

* Pawnee City, 30 2 Table Rock.

NEW YORK.

37 Annawalk.

37 Ashford.

37 Baldwin Place.

33 Cold Spring.

36 East Hoosick.

33 Kimsford.

33 Hinesdale.

37 Merritts Corners.

41 North Yonkers.

33 Port Jefferson.

33 St. James.

33 St. Johnland.

* * Setauket, 25 cents delivery from Stony Brook.

33 Smithtown.

37 South Dover.

41 South Yonkers.

33 Springfield.

33 Stony Brook.

46 Tompkins Cove.

NOVA SCOTIA.

2 Jordan River.

OHIO.

170 Fair Point, Belmont Co.

ONTARIO.

* Merlin.
* Sligo Station.
* Uptoff.

PENNSYLVANIA.

130 Clarendon. Check Warren.

150 Cooperstown, Venango Co.

59 East Falls (also known as Falls of Schuylkill), check Falls of Schuylkill.

* North Warren, free, by telephone, from Warren.

111 Simpson P. O. A. care Aiken.

* Stoneham, free, by telephone, from Warren.

59 West Falls (also known as Falls of Schuylkill), check Falls of Schuylkill.

TEXAS.

510 Greenville.

510 Kingston.

Offices having "Special Sheet K" will erase the following from the list of sheet "K" offices:

111 Cole Creek, Pa.	47 Long Branch, N. J.
33 Cone Island, N. Y.	21 Manchester, Mass.
140 Crawford's Corners, Butler Co., Pa.	201 Milan, O.
18 Fall River, Mass.	284 Tullahoma, Tenn.
41 High Bridge, N. Y.	141 Uniontown, Pa.
	46 West Point, N. Y.

The following should be added to the list of sheet "K" offices:

84 Adamsburg, Pa.	85 Bruceville, Md.
94 Aqueduct, "	112 Barre, Pa.
253 Aurora, Ind.	84 Beavertown, Pa.
42 Atlantic City, N. J.	102 Beech Creek Depot, Pa.
131 Allegheny Junction, Pa.	102 Bigler, Pa.
131 Apollo, Pa.	85 Cockeysville, Md.
131 Blairsville, Pa.	47 Cream Ridge, N. J.
131 Blairsville Intersection, Pa.	93 Carpenter, Pa.
131 Brinton, Pa.	84 Coburn, Pa.
84 Bloomsburg, Pa.	102 Curwensville, Pa.
112 Bells Mills, "	217 Covington, Ga.
565 Breckenridge, Col.	163 Charlotte, N. C.
466 Baldwin, Ka.	111 Cameron, Pa.
599 Buena Vista, Col.	112 Conemaugh, Pa.
	130 Corry, Pa.

235,056.—TELEPHONE EXCHANGE APPARATUS. James W. See, Hamilton, Ohio. Filed July 12, 1880. (Model.)	47 Freehold, N. J.
235,058.—CALL APPARATUS FOR TELEGRAPH LINES. James P. Stables, Sandy Spring, Md. Filed Nov. 26, 1880. (Model.)	85 Glencoe, Md.
RE-ISSUE.	98 Gillette, Pa.
9,484.—TELEGRAPH INSULATOR. John L. Finn, Elyria, Ohio, assignor to Amzi S. Dodd, New York, N. Y.; said Dodd assignor to the "Hinnock Electrical Company, same place. Filed August 28, 1880. Original No. 75,887, dated March 24, 1868.	85 Glen Rock, Pa.
<i>Titles of Patents issued December 7, 1880.</i>	76 Goldsboro, Y. Co., Pa.
235,066.—TELEPHONE AND MICROPHONE SWITCH. A. E. Briggs, Cincinnati, Ohio, assignor to Post & Co., same place. Filed June 2, 1880. (No model.)	134 Greensboro, N. C.
235,120.—PHOTOGRAPHIC TRANSMITTER. Emile Berliner, Boston, Mass. Filed September 8, 1880. (No model.)	28 Greenfield, Mass.
235,132.—ELECTRICAL SIGNAL. Charles Cummings, Virginia City, Nevada, assignor to one-half to Newton M. Bell, same place. Filed June 18, 1880. (No model.)	112 Gallitsin, Pa.
235,142.—ACOUSTIC TELEGRAPH. Thomas A. Edison, Menlo Park, N. J., assignor to Western Union Telegraph Company, New York, N. Y. Filed September 30, 1878.	130 Garland, "
235,145.—ELECTRICAL RAILWAY SIGNAL. Israel Fisher, Boston, Mass., assignor to the Union Electric Signal Company. Filed March 27, 1880. (No model.)	102 Grove, "
235,147.—ELECTRIC CALL-BELL. James Frankie and Clarence E. Kelley, Haverhill, Mass. Filed Dec. 27, 1879.	112 Henrietta, "
235,159.—ELECTRIC TELEGRAPH. Orazio Lugo, New York, N. Y. Filed June 10, 1880. (No model.)	36 Hoosick, N. Y.
235,160.—TELEGRAPHING BY INDUCED CURRENTS. Orazio Lugo, New York, N. Y. Filed August 23, 1880. (No model.)	108 Hagerstown Md.
235,161.—ELECTRIC TELEGRAPH. Orazio Lugo, New York, N. Y., assignor to Samuel L. M. Barlow, same place. Filed May 10, 1880. (No model.)	40 Hansonville, N. Y.
235,173.—MAGNETO-ELECTRIC SPEAKING TELEPHONES. Francesco Rosetti, Padua, Italy, assignor to Samuel L. M. Barlow, New York, N. Y. Filed May 20, 1880. (No model.)	65 Homer, N. Y.
235,195.—ELECTRO-MAGNETIC ROCK-DRILL. Chas. E. Ball, Philadelphia, Pa., assignor to Chas. A. Cheever, Trustee, New York, N. Y. Filed April 26, 1880. (No model.)	85 Hollins, Md.
235,199.—APPARATUS FOR SIGNALING AND COMMUNICATING, CALLED "PHOTOPHONE." Alexander G. Bell, Washington, D. C., assignor to the American Bell Telephone Company, Boston, Mass. Filed August 28, 1880. (No model.)	47 Hightstown, N. J.
235,203.—CARBON PENCIL FOR ELECTRIC LIGHTS. Julius E. Braunsdorf, Pearl River, N. Y. Filed July 1, 1880. (No model.)	85 Parkton, Md.
235,224.—GALVANIC BELT. Edwin J. Fraser, San Francisco, Cal. Filed August 14, 1880. (Model.)	69 Quakertown, Pa.
235,258.—ELECTRIC LAMP. John W. Langley, Ann Arbor, Mich. Filed July 16, 1880. (No model.)	93 Ralston, "
<i>Titles of Patents issued December 14, 1880.</i>	93 Roaring Branch, Pa.
235,385.—DYNAMO-ELECTRIC MACHINE. William Sawyer, New York, N. Y., assignor to Eastern Electric Manufacturing Co., Middletown, Conn. Filed August 19, 1880. (No model.)	76 Rockville, "
235,424.—ELECTRIC SIGNAL APPARATUS FOR TELEPHONES. Anthony M. Frankenberg, Baltimore, Md. Filed October 24, 1879.	111 Bathbun, Pa.
235,433.—MAGNETO-ELECTRIC MACHINE. Otto Heikel, Jersey City, N. J., assignor to the National Electric Light and Power Company, New York, N. Y. Filed May 12, 1879.	112 Boaring Springs, Pa.
235,459.—ELECTRIC LAMP. William Sawyer, New York, N. Y., assignor to Eastern Electric Manufacturing Co., Middletown, Conn. Filed September 12, 1880. (No model.)	111 St. Marys, Pa.
235,460.—ELECTRIC LIGHTING SWITCH. William E. Sawyer and William Sawyer, New York, N. Y., assignors to Eastern Electric Manufacturing Co., Middletown, Conn. Filed Oct. 6, 1880. (No model.)	181 Saltsburg, "
235,475.—TELEGRAPH RELAY APPARATUS. Henry Van Hovenbergh, Elizabeth, N. J., assignor to the American Union Telegraph Company, New York, N. Y. Filed September 1, 1880. (No model.)	151 Sharpsburg, Pa.
235,502.—UNDERGROUND TELEGRAPH. David Brooks, Jr., Philadelphia, Pa. Filed June 2, 1880. (No model.)	130 Sheffield, Pa.
235,508.—ELECTRIC SPEAKING-TELEPHONE. Charles A. Cheever, New York, N. Y. Filed March 12, 1880. (No model.)	112 Sonman, "
235,569.—AUTOMATIC TRANSMITTER FOR ELECTRICAL INDICATORS. Chester H. Pond, New York, N. Y. Filed September 4, 1880. (Model.)	139 Spring Creek, Pa.
235,611.—CONDUCTOR FOR UNDERGROUND TELEGRAPH LINES. John D. Townsend, New York, N. Y., assignor of two-fifths to Charles L. Gore, same place. Filed September 18, 1880. (No model.)	181 Springdale, "
RE-ISSUE.	111 Sterling, "
9,499.—TELEPHONE. Emile Berliner, Boston, Mass., assignor to the National Bell Telephone Company, same place. Filed October 23, 1880. Original No. 199,141, dated January 15 1878.	426 Stuart, Iowa.
<i>Titles of Patents issued December 21, 1880.</i>	110 Stafford, N. Y.
235,616.—PROCESS OF TREATING SELENIUM TO INCREASE ITS ELECTRIC CONDUCTIVITY. Alexander G. Bell, Washington, D. C., and Sumner Tainter, Watertown, Mass.; said Bell assignor to the American Bell Telephone Company. Filed August 28, 1880. (No specimens.)	265 Sewanee, Tenn.
235,635.—TELEPHONE TRANSMITTER. Frank A. Klemm, New York, N. Y., assignor by mesne assignments, to the People's Telephone Company, same place. Filed November 18, 1879.	87 South Norwalk, Conn.
235,656.—RELAY TELEPHONE. Henry C. Strong, Chicago, Ill. Filed May 10, 1880. (No model.)	102 Sandy Ridge Pa.
235,687.—DYNAMO-ELECTRIC TELEGRAPH. Orazio Lugo, New York, N. Y. Filed November 11, 1880. (No model.)	76 Safe Harbor, "
235,688.—DYNAMO-ELECTRIC TELEGRAPH. Orazio Lugo, New York, N. Y. Filed November 9, 1880. (No model.)	84 Selins Grove, "

Transfer Service.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, December 29, 1880.

To all Transfer Agents:

On January 1st, 1881, a new Transfer Agency will be established at Dallas, Texas, and placed in charge of G. M. Baker.

The following named offices in L. C. Baker's District will be transferred on the date named to the new district and all transfers for such offices will, on and after such date, be addressed to G. M. Baker, at Dallas, Texas.

Austin, Tex.	Indianola, Tex.
Brenham, "	Jefferson, "
Brownsville, Tex.	Long View, "
Bryan, "	Marshall, "
Calvert, "	Monroe, La.
Corpus Christi, "	Navasota, Tex.
Coriscana, "	Rockport, "
Dallas, "	Sherman, "
Denison, "	San Antonio, "
Fort Worth, "	Shreveport, La.
Galveston, "	Tyler, Tex.
Houston, "	Waco, "

Managers will correct their lists accordingly.

NORVIN GREEN,

President.

ATLANTIC AND PACIFIC TELEGRAPH COMPANY.

EXECUTIVE OFFICE,
New York, December 29, 1880.

To all Atlantic and Pacific offices:

Atlantic and Pacific offices have been opened as follows:
Square 321 Jackson, Tenn.
" 124 Danville, Va.

Offices Closed:

Atchison, Kas.	Lenape, Pa.
Birdsboro, Pa.	North Adams, Mass.
Chadd's Ford Junction, Pa.	Northbrook, Pa.
Ocoatesville, Pa.	Po'keepsie, N. Y.
Dupont, Del.	Reading, Pa.
Embreeville, Pa.	St. Joseph, Mo.
Hope, B. I.	Waynesburg Junction, Pa.
Joanna, Pa.	

A. B. CHANDLER,

President.

Patented Inventions.

Titles of Patents granted Nov. 23d, 1880.

- 234,820.—APPARATUS FOR DISTRIBUTING CURRENTS IN ELECTRIC LIGHTS. George Sweeney, Montreal, Quebec, Canada. Filed August 30, 1880. (No model.)
- 234,835.—ELECTRIC LAMP. Hiram S. Maxim, Brooklyn, assignor by mesne assignment, to the United States Electric Lighting Company, New York, N. Y. Filed May 4, 1880. (No model.)

Titles of Patents issued Nov. 30, 1880.

- 234,902.—ELECTRICAL ALARM ATTACHMENT FOR PRESSURE GAUGES. John B. Arnold, Ottawa, Ontario, Canada. Filed August 8, 1879.
- 234,945.—ELECTRICAL INDICATOR FOR ELEVATORS. Henry C. Bliss, West Springfield, Mass. Filed March 25, 1880. (No model.)

- 234,978.—TELEPHONE. John Goodman, Louisville, Ky. Filed August 7, 1880. (No model.)

- 234,993.—ELECTRICAL ANNUNCIATOR. Thomas W. Lane, Boston, assignor to himself and Chas. Williams, Jr., Somerville, Mass. Filed August 30, 1880. (No model.)

- 235,019.—TELEPHONE SYSTEM. Charles A. Randall, New York, N. Y. Filed March 29, 1880. (No model.)

- 235,020.—TELEPHONE SYSTEM AND APPARATUS. Charles A. Randall, New York, N. Y. Filed May 5, 1880. (No model.)

- 235,021.—TELEPHONE RECEIVER. Charles A. Randall, New York, N. Y. Filed April 5, 1880. (No model.)

- 235,024.—ELECTRICAL GAS-LIGHTING BURNERS. David Bousseau, New York, N. Y. Filed July 28, 1880. (Model.)

- 235,025.—ELECTRIC RAILWAY SIGNAL. Albert L. Russell, Somerville, assignor to himself and E. B. Welch, Cambridge, Mass. Filed August 13, 1880. (No model.)

- 235,049.—ACOUSTIC TELEPHONE. Henry T. Walters and Winfield Voorhis, Bushnell, Ill., assignors of one-third to Charles West, same place. Filed March 20, 1880. (Model.)

ATLANTIC CABLE.

The cable between Bahia and Rio de Janeiro, South America, is interrupted. Messages for Rio and places beyond, will be forwarded by best means. No change in rates.

NORVIN GREEN,

President.

"I am very much afraid of lightning," said a pretty lady. "And well you may be," said her lover, "as your heart is made of steel."

The control of the telephone service by the government is not pleasing to the British public.

- 235,689**.—DYNAMO-ELECTRIC TELEGRAPHY. Orazio Lugo, New York, N. Y. Filed September 25, 1880. (No model.)
- 235,690**.—DYNAMO-ELECTRIC AND INDUCTION TELEGRAPHY. Orazio Lugo, New York, N. Y. Filed September 25, 1880. (No model.)
- 235,707**.—TELEPHONE TRANSMITTER. George W. Smith, New Hartford, Conn. Filed July 25, 1880. (No model.)
- 235,734**.—UNDERGROUND TELEGRAPH. David Brooks, Jr., Philadelphia, Pa. Filed June 5, 1880. (No model.)
- 235,735**.—METHOD OF INTRODUCING TELEGRAPH WIRES INTO PIPES. David Brooks, Jr., Philadelphia, Pa. Filed June 8, 1880. (No model.)
- 235,769**.—ELECTRIC LIGHTING ATTACHMENT FOR GAS-BURNERS. Charles H. Hinds, New York, N. Y. Filed 7, 1880. (No model.)
- 235,817**.—AUTOMATIC ELECTRIC CIRCUIT-CLOSER. Wm. H. Shuey, Minneapolis, Minn. Filed October 13, 1880. (No model.)

RECENT ENGLISH PATENTS.

- 4,341**.—AN IMPROVED ELECTRICAL APPARATUS FOR OPERATING BELLS, SIGNALS, AND TELEGRAPHS. G. Skrivanoff. October 25, 1880.
- 4,391**.—IMPROVEMENTS IN MEANS FOR MEASURING THE AMOUNT OF ELECTRICAL CURRENT FLOWING THROUGH A CIRCUIT, WHICH IS DENOMINATED A WHEELETTER. P. Jensen. (Communicated by T. A. Edison.) October 27, 1880.
- 4,393**.—ELECTRIC LIGHTING APPARATUS. W. R. Lake. (Communicated by H. S. Maxim.) October 27, 1880.
- 4,428**.—ELECTRIC LAMP. J. H. Johnson. (Communicated by A. Berlot.) October 29, 1880.
- 4,434**.—TELEGRAPHIC RECORDING APPARATUS. T. M. Foote. October 3, 1880.
- 4,441**.—IMPROVEMENTS IN ALARMS AND INDICATING APPARATUS FOR BOILERS, CISTERNS, TANKS, VENTILATORS, AND THE LIKE. F. Kling and G. Green. October 30, 1880.
- 4,444**.—ELECTRIC GAS-LIGHTING-APPARATUS. H. H. Lake. (Communicated by F. W. Felton.) October 30, 1880.
- 4,442**.—CABLES FOR TELEPHONE PURPOSES. E. George and J. B. Morgan. November 3, 1880.
- 4,493**.—ELECTRIC LIGHTING APPARATUS. W. R. Lake. (Communicated by J. V. Nichols.) November 3, 1880.
- 4,515**.—IMPARTING ELECTRIC CURRENTS TO FLUIDS WHILE PASSING INTO THE MOUTH. J. Dunbar and M. R. Harper. November 4, 1880.
- 4,514**.—IMPROVED THERMOMETERS AND BAROMETERS WITH ELECTRIC SCALE. E. Edmond. (Communicated by O. Koch, and A. Eichhorn.) November 6, 1880.
- 4,581**.—TELEGRAPH RECEIVING APPARATUS. J. W. Fuller. November 8, 1880.
- 4,584**.—DYNAMO-ELECTRIC MACHINES AND LAMPS FOR ELECTRIC LIGHTING. J. Hopkinson and A. Muirhead. November 23, 1880.
- 4,587**.—SPEAKING-TUBES AND ELECTRIC BELLS FOR USE WITH THE SAME. APPLICABLE ALSO FOR OTHER PURPOSES. G. Jennings and E. G. Brewer. Nov. 24, 1880.
- 4,614**.—ELECTRIC LIGHT APPARATUS. W. L. Wise. (Communicated by J. A. Maudou.) Nov. 25, 1880.
- 4,608**.—IMPROVEMENTS IN THE MEANS AND APPARATUS FOR GENERATING, SUB-DIVIDING, AND TRANSMITTING ELECTRIC CURRENTS, ALSO IN ELECTRIC LAMPS. C. F. Heinrichs. Nov. 9, 1880.
- 4,614**.—ELECTRIC LAMPS. C. W. Siemens. Nov. 10, 1880.
- 4,621**.—MAGNETO-ELECTRIC SIGNAL APPARATUS. E. G. Brewer. (Communicated by E. H. Johnson and T. A. Edison.) Nov. 10, 1880.
- 4,628**.—STEP BY STEP TYPE PRINTING TELEGRAPHS. F. H. W. Higgins. Nov. 10, 1880.
- 4,674**.—TELEGRAPH CABLES. R. Kindall. Nov. 13, 1880.
- 4,739**.—ELECTRIC BATTERIES. H. E. Newton. (Communicated by L. A. W. Desvuelles.) Nov. 17, 1880.
- 4,745**.—ELECTRIC LAMPS. J. E. H. Gordon. Nov. 17, 1880.
- 4,755**.—ELECTRIC LAMPS AND APPARATUS CONNECTED THEREWITH. J. A. Berley and D. Hulet. Nov. 18, 1880.
- 4,779**.—AN IMPROVED ELECTRO-MAGNETIC APPARATUS FOR TABLE SERVICES, OFFICES, AND WAREHOUSES. F. Hartman. Nov. 19, 1880.
- 4,825**.—DYNAMO-ELECTRIC MOTORS. C. Kessler. (Communicated by E. Kuhls.) Nov. 24, 1880.

CONTINUOUS CURRENT.

DYNAMO ELECTRIC MACHINES
FOR TELEPHONE EXCHANGES.

Capacity from 500 to 5,000 Cells.

Address J. E. BRAUNSDORF & CO.,
15 DEY STREET, NEW YORK.

PROPOSALS FOR CROSS-ARMS.

THE WESTERN UNION TELEGRAPH COMPANY invites proposals until 12 o'clock noon, Monday, January 24th, 1881, for two million (2,000,000) feet of seasoned white pine lumber, to be made into cross-arms as required.

The cross-arms are to be 3½ by 4½ inches, when dressed and finished for use. They are to be free from sap, and any cross-arm with knots larger than a silver "quarter" will be rejected.

The arms are to be made three (3) feet, six (6) feet and eight (8) feet in length, or longer, as required. They are to be planed on all sides, bored for proper number of pins, and with one or two bolt-holes in the center, also chamfered on top like sample.

Sample can be had on application at the Western Union Telegraph Co.'s Supply Department, New York or Chicago.

The price named for the lumber is to be given by the foot (board measure) for the cross-arms, completed and delivered on board, and not for the lumber before it is made up.

The party who takes the contract must furnish sufficient room (under cover) for painting and drying the cross-arms; the Telegraph Company to furnish the paint and do the painting, and the contractor will be required to keep on hand, at all times, not less than 5,000 cross-arms of each of the sizes generally used, which are 3 feet, 6 feet and 8 feet in length.

Delivery to commence about June 1st, 1881, and the whole amount to be delivered within one year from date of award of contract.

The deliveries to be as follows: The product of 1,000,000 feet to be delivered at the Chicago Supply Department, or free on board at Chicago, as may be ordered from time to time; the product of 500,000 feet, free on board at Albany, New York, or some central point in the New England States, and the balance (500,000 feet), free on board at Norfolk, Va., or some central point in the Southern States.

Bidders may make proposal for the whole amount of cross-arms to be delivered at either point named, or for each of the amounts named at the points of delivery.

Cross-arms are to be subject to inspection and acceptance or rejection by an officer of the Company.

Payments to be made between the 15th and 25th of each month following the deliveries.

The right is reserved to reject any and all bids, or to accept any one which may seem for the best interest of the Company.

The party whose tender is accepted will be required to give bond with two (2) sureties for the proper fulfillment of the contract.

Proposals should be sealed and addressed to the undersigned, endorsed

"PROPOSALS FOR CROSS-ARMS."

WM. HUNTER,

Supt. Supplies.

NEW YORK, Dec. 28th, 1880.

A copy of this specification must be attached to each bid.

PROPOSALS FOR OFFICE WIRE.

THE WESTERN UNION TELEGRAPH CO. invites proposals until 12 o'clock noon, Monday, January 24th, 1881, for a six months' supply of cotton-covered office wire.

Estimated quantity required, 9,000 lbs. To be of any size, No. 14 to No. 20 inclusive.

The copper to be at least 90 per cent. purity; well centered in the insulating substance. Cotton covering to be braided closely and in workmanlike manner. All covering to be not only firm, but free from flaws.

Samples of wire to be submitted with bid; and all wire furnished on account of contract to be subject to inspection and acceptance by an officer of the company.

The right is reserved to reject any and all bids or to accept any one which may seem for the best interest of the company.

The party whose tender is accepted will be required to give bond with two sureties for the proper fulfillment of contract.

Deliveries on account of contract to begin Feb. 13th 1881, or as soon thereafter as required.

Bills to be paid between the 15th and 25th of month following the deliveries.

Each bid must include delivery at Supply Department, New York or Chicago, free of charge for freight, package and cartage. Proposals should be sealed and addressed to the undersigned, endorsed

"PROPOSALS FOR OFFICE WIRE."

WM. HUNTER,

Supt. Supplies.

New York, Dec. 29th, 1880.

A copy of this specification must accompany each bid.

PROPOSALS FOR COAL.

THE WESTERN UNION TELEGRAPH COMPANY invites proposals until 12 o'clock noon, Monday, January 10, 1881, for 1000 gross tons "Old Company's" Lehigh Nut Coal, to be delivered as required at the rate of about 150 tons per month, the first delivery to be made about the 25th day of January, 1881.

The coal to be delivered and stored in the vaults cor. Broadway and Dey St., before 9 A.M. and after 5 P.M.

A cargo of 150 to 175 tons may be delivered at one time if more convenient to the contractor, or it may be delivered in small quantities.

If delivered by cargo, a bill of lading must be attached to the invoice showing it to be "Old Company's" Lehigh.

A certificate sworn to by a weigher, that the weights are correct, must accompany all invoices.

Proposals for any other than "Old Company's" Lehigh will not be considered.

Bills to be paid between the 15th and 25th of the month following the deliveries. The right is reserved to reject any and all bids, or to accept any one which may seem for the best interest of the Company.

The party whose tender is accepted may, at the option of the Company, be required to give bond with two sureties, for the proper fulfillment of the contract.

Tenders should be sealed and addressed to the undersigned, endorsed

"PROPOSALS FOR COAL."

WM. HUNTER,

Supt. Supplies.

New York, Dec. 23d, 1880.

DIVIDEND NO. 54.

WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Dec. 8, 1880.

The Board of Directors have declared a quarterly dividend of ONE and ONE-HALF PER CENT, upon the capital stock of this Company, from the net earnings of the three months ending December 31 instant, payable at the office of the Treasurer on and after the 15th day of January next, to shareholders of record on the 20th day of December instant.

The transfer books will be closed at 3 o'clock on the afternoon of the 2nd of December instant and opened on the morning of the 17th of January next.

R. H. ROCHESTER,

Treasurer.

DIVIDEND NO 10.

ATLANTIC AND PACIFIC TELEGRAPH CO.,
EXECUTIVE OFFICE,
145 Broadway, New York, December 7, 1880.

At the Quarterly Meeting of the Board of Trustees of the Atlantic and Pacific Telegraph Company, held this day, a dividend of THREE-QUARTERS OF ONE PER CENT, upon the capital stock of the company outstanding was declared payable from the net earnings for the quarter ending November 30, 1880, at the office of the treasurer, on and after the 30th day of December, 1880, to all stockholders of record at the close of the transfer books at 3 o'clock P. M., on Saturday, the 15th day of December, 1880. The transfer books will be opened on the morning of January 3, 1881.

E. B. FOWLER,

Treasurer.

TELEPHONE INSTRUMENTS.

Manufactured under Letters Patent and License of the

NATIONAL BELL TELEPHONE CO.

ALL KINDS OF TELEPHONE SUPPLIES.

ELECTRIC MERCHANDIZING CO.,

76 MARKET STREET, CHICAGO.

TWO
POPULAR SCIENTIFIC WORKS.ELECTRICITY AND THE ELECTRIC TELEGRAPH,
BY GEORGE B. PRESCOTT,

THIRD EDITION.

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THE SPEAKING TELEPHONE, ELECTRIC LIGHT, AND
OTHER RECENT ELECTRICAL INVENTIONS,

BY GEORGE B. PRESCOTT.

Over 600 pages. More than 400 diagrams and Illustrations.
Price, \$4.00.

LIBERAL TERMS TO AGENTS.

Application for Agencies, and Orders, with remittances by check, draft, postal money order or registered letter addressed to the subscriber, will receive prompt attention.

Money forwarded otherwise will be at the risk of the sender.

Address,

J. N. ASHLEY,

Care JOURNAL OF THE TELEGRAPH,

New York.

**PURE ELECTRIC WIRE.**

MANUFACTURED BY THE

ANSONIA BRASS AND COPPER COMPANY,
For Magnets, Telegraphs, Telephones, etc.,
Insulated on the Bare Wire with
H. SPLITDORF'S PATENTED LIQUID INSULATION,
COVERED WITH COTTON OR SILK.

ALL SIZES OF

BARE AND COVERED WIRE IN STOCK.

The Conductivity of every Bundle tested and warranted.

THE ANSONIA WROUGHT GONGS

FOR CLOCKS, INDICATORS,

Telephones, Call-Bells, Bell-Punches, Steamboat
and Railroad use.

BURNISHED OR NICKEL-PLATED.

19 CLIFF STREET, NEW YORK.

THE GAMEWELL FIRE ALARM TELEGRAPH COMPANY.

OFFICE: NOS. 5 AND 7 DEY STREET, NEW YORK.

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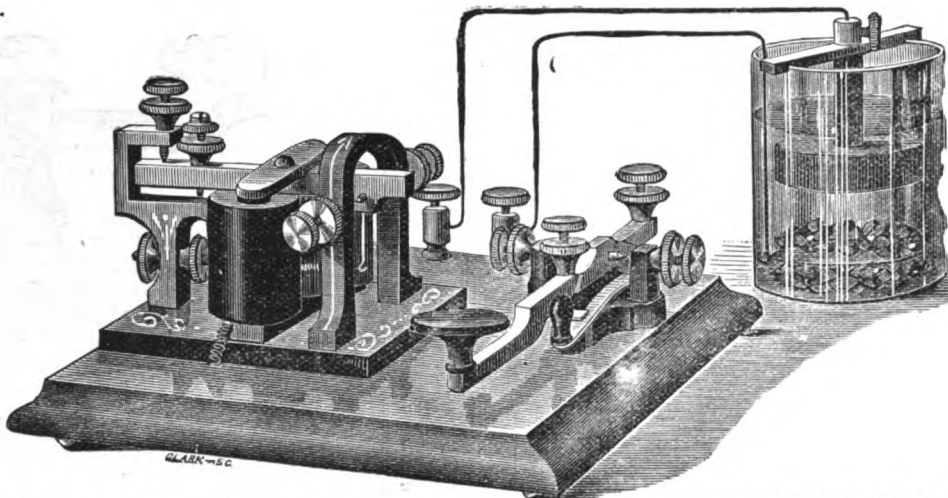
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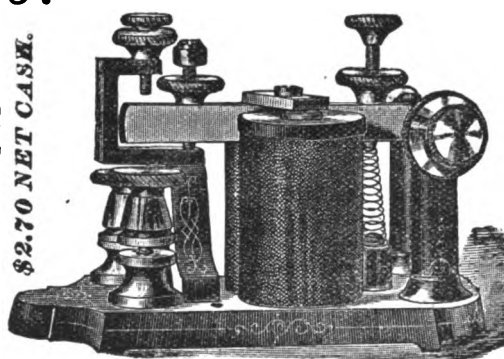
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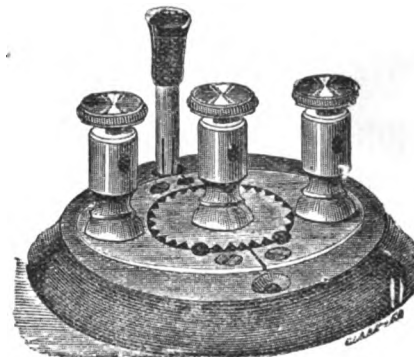
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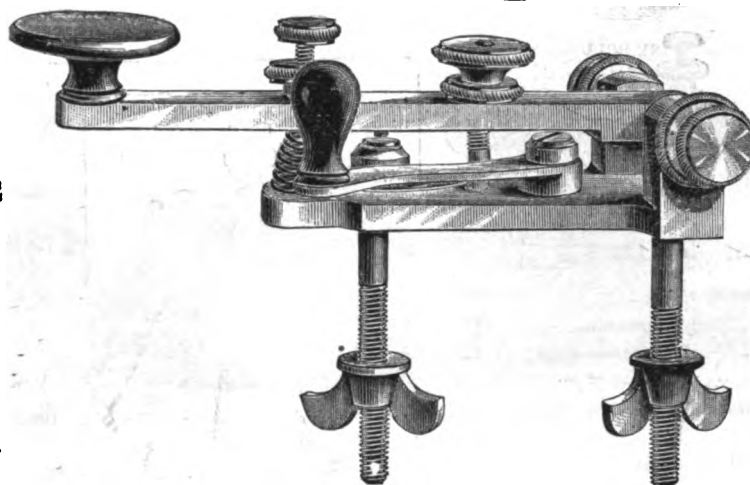
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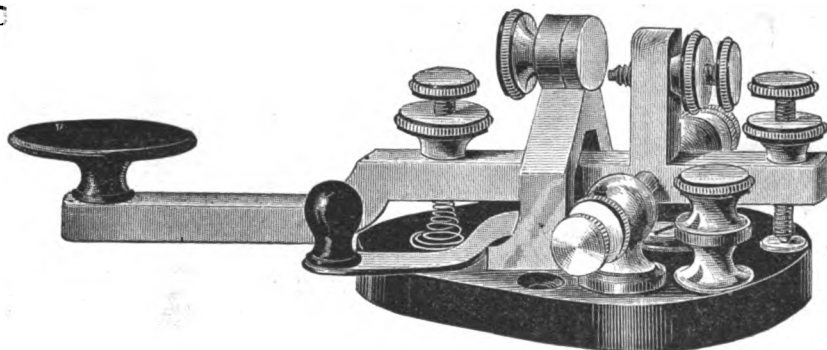
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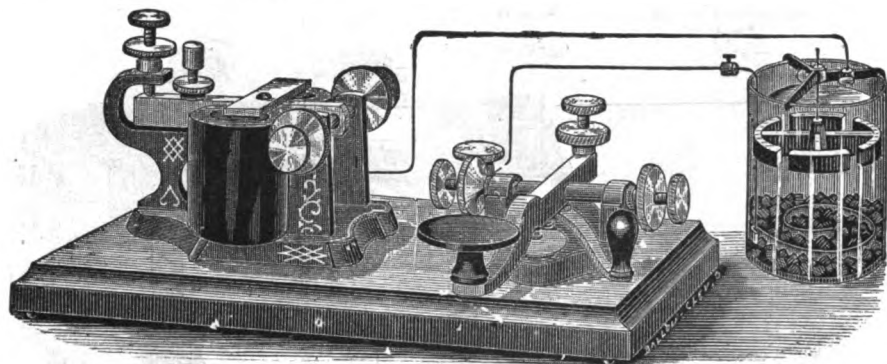
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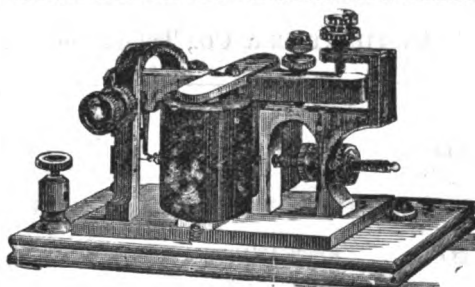
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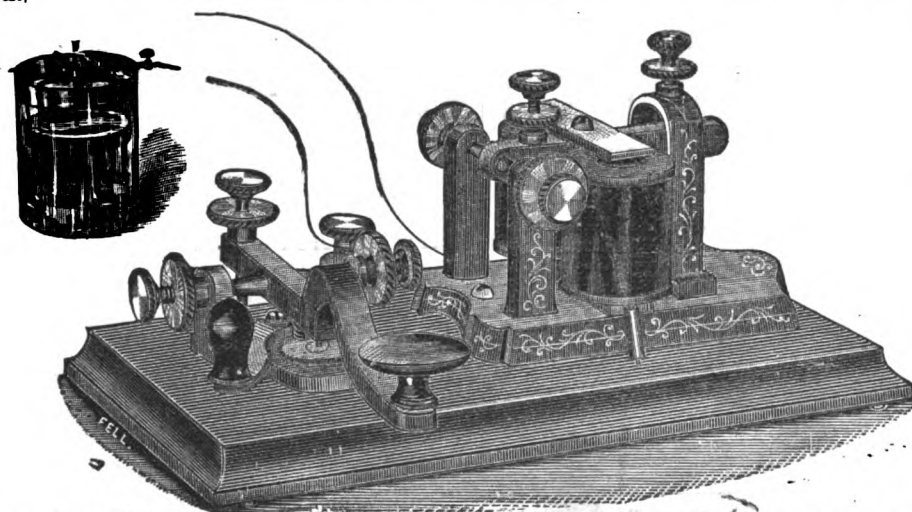


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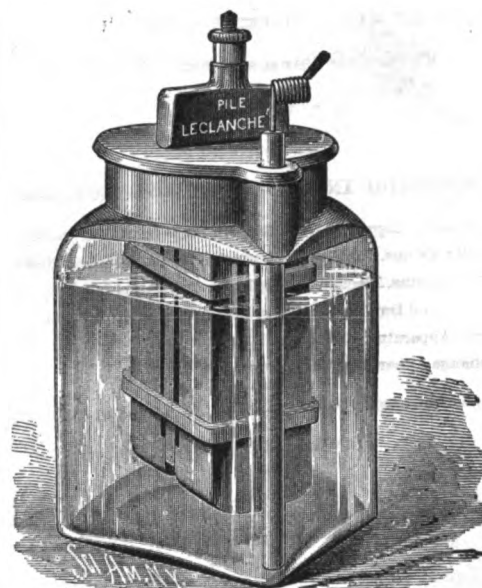
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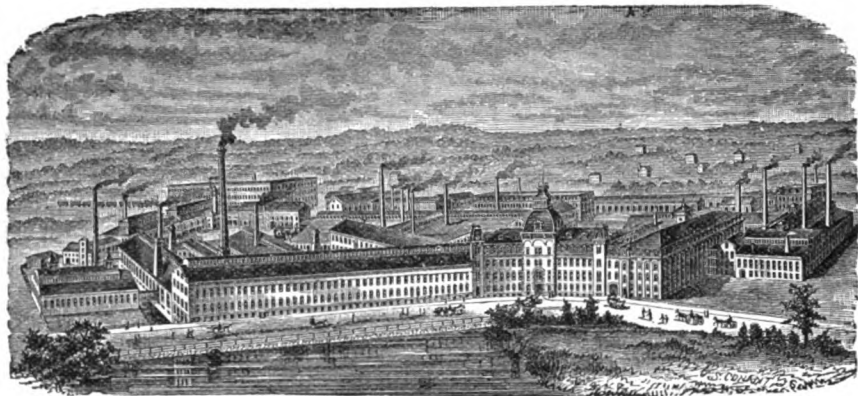
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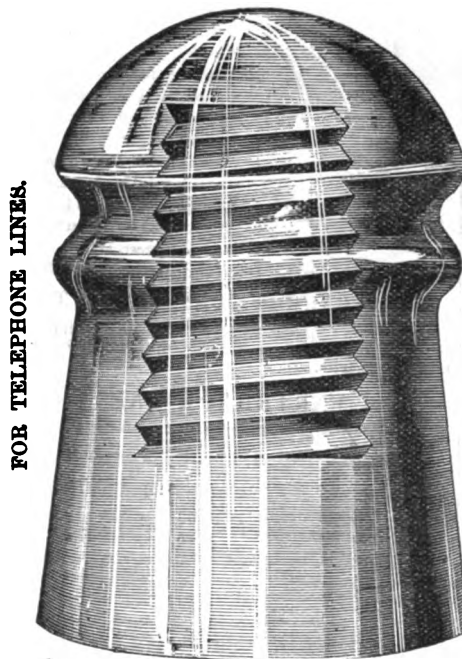
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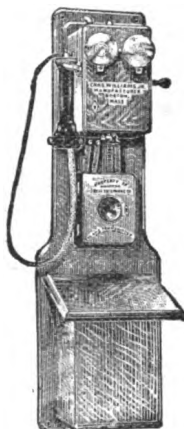
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JOURNAL OF THE TELEGRAPH.

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WHOLE NO. 318.

From the *New York World*.]

THE HISTORY OF WESTERN UNION.

An Account of the Formation of the Present Company by Sixty Successive Consolidations.

THE present consolidation of the telegraph companies is nothing new in the history of the Western Union Telegraph Company, though it is more important on account of the amounts involved than any other that has taken place. The present company was formed through the successive consolidations of companies, some of which themselves were the results of similar unions. An account of the corporation will be of interest now in view of the proposed union. The matter which is given below is obtained from the most trustworthy sources, and the statements may be regarded as officially accurate so far as they go.

In April, 1851, the New York and Mississippi Valley Printing Telegraph Company was organized under the general laws of 1848, in New York State. It was to continue in existence 100 years, and its authorized capital was \$360,000. One-half of the capital stock was to be issued to Royal E. House for the exclusive right of constructing and using his patent printing telegraph, and the other half was to be used to construct, complete and put in operation the line which Isaac Butts and Sandford J. Smith had already begun to put up from Buffalo, N. Y., to St. Louis, Mo. The incorporators were Samuel L. Selden, Freeman M. Edson and Isaac Butts, of Rochester, N. Y., and Sandford J. Smith, of St. Louis. The company was authorized to construct a line from Buffalo to St. Louis via Cleveland, Columbus, and Cincinnati. Under this organization the line was completed to Louisville, Ky., a distance of 600 miles.

On January 20th, 1854, by a resolution of the Board of Directors the capital stock of the company was fixed at \$170,000, divided into shares of \$100 each. The number of shareholders had increased to twenty-nine. R. E. House was not then a stockholder. A new certificate of incorporation was filed under the laws of New York, of June 29, 1853, chapter 471. On March 30th, 1854, the company bought of the Lake Erie Telegraph Company lines running from Buffalo to Detroit and from Cleveland to Pittsburg, about 600 miles in length. On November 1st, 1855, the stock of the New York and Mississippi Valley Printing Telegraph Company was consolidated with that of the Erie and Michigan Telegraph Company, which owned a line from Buffalo to Milwaukee via Cleveland, Detroit and Chicago. The line was 900 miles long, and had about one thousand three hundred miles of wire. The capital stock of this latter company was \$170,000, and the amount paid in was \$145,400. On April 4, 1856, the name of the New York and Mississippi Valley Printing Telegraph Company was changed by a special act of the New York Legislature, chap. 97, to "The Western Union Telegraph Company."

The authorized capital of the company then was \$500,000, of which only about three-fourths had been issued. On August 19th, 1858, the first scrip dividend was declared, being 33 per cent. on \$369,700, the amount of outstanding stock. On September 22nd of the same year, after the amount of the authorized capital had been increased, a scrip dividend of 41 40-100 per cent. on the capital stock of \$485,700 was issued. Three more scrip dividends were issued previous to the purchase of other lines by issuing stock. They were as follows: July 16th, 1862, 27 26-100 per cent. on the capital stock outstanding of \$2,355,000; March 16th, 1863, 100 per cent. on the capital stock outstanding of \$2,979,300, and December 23d, 1863, 33 1/3 per cent. on the capital of \$5,963,600, increasing the capital stock to \$7,950,700. About January, 1864, an arrangement was made for the purchase of the Pacific Telegraph Company, a corporation chartered in the State of Nebraska, and authorized to buy, build and operate a telegraph line from some point within a territory or State east of the Rocky Mountains to San Francisco. Its capital was \$1,000,000. The purchase was effected by an exchange of the Western Union stock, issued for that purpose, for the stock of the Pacific Telegraph Company, the amount being \$1,277,210.

Up to this time the lines owned by the Western Union were all west of Buffalo, and the chief executive offices were at Rochester, N. Y. The next purchase was that of the line of the New York, Albany and Buffalo Company by an exchange of stock amounting to \$600,000, and the purchase of the New York State Printing Telegraph Company in a like manner for \$146,500 followed. The stock needed for this purpose was all issued between January 1st, 1864, and May 16th, 1864. The executive office remained in Rochester until July 1st, 1866, when it was removed to New York City.

On May 11, 1864, a stock dividend of 100 per cent. per share was made, which increased the capital to \$20,133,800. The increase of stock from that time to July 1, 1869, was as follows:

For Atlantic and Ohio Telegraph stock.....	\$833,400
For Erie and Michigan Telegraph stock.....	68,000
For House Telegraph stock.....	5,700
For Pemberton & Golden, Trustees, etc.....	3,800
For cash.....	77,000
For Western Union bonds.....	91,500
For Ithaca Telegraph stock.....	14,500
For California State Telegraph stock.....	164,700
For Syracuse and Binghamton Telegraph stock...	4,900
For Missouri and Kansas Telegraph stock.....	80,400
For United States Telegraph stock.....	3,885,200
For United States Pacific Telegraph stocks.....	3,333,300
For equalization of stock as per consolidation agreement.....	468,000
For fractions.....	55,100
For Trumansburg and Seneca Falls stock.....	8,500
For Hicks and Wright Repeater.....	1,500
For Lodi Telegraph stock.....	500
For American Telegraph stock.....	11,833,100
For Pittsburg, Cincinnati and Louisville stock....	4,100

This made the total capital stock... \$41,063,100

In January, 1870, the capital was \$41,070,610, and in January, 1873, \$41,073,410. It remained at that figure until the present time.

A few of the shares of the lines purchased have not yet been offered for exchange, but they are counted with those issued according to the agreed rate of exchange.

No other telegraph companies than those above mentioned have been directly purchased by the Western Union Telegraph Company by the issuance of stock, but many of those named had previously consolidated with other companies. This is especially true of the American Telegraph Company, which was chartered by the State of New Jersey, and was organized in 1859 by a consolidation of the following associations: The American Telegraph Company of New York, the New York and Washington Printing Telegraph Company, the Magnetic Telegraph Company of New Jersey, and the New York and New England Union Telegraph Company. It also acquired possession of the Maine, New Brunswick, Nova Scotia, Troy and Canada Junction, Long Island, St. John and Fredericton, and Richmond, Charlotteville and Staunton lines, and subsequently of those of the Cape Cod, Cape Cod Marine, Vermont and Boston, Lynchburg and Abingdon, East Tennessee, Delaware and Hudson, Philadelphia and Wilkesbarre, Susquehanna, Baltimore and Ohio, Washington and New Orleans, and Southwestern Telegraph Companies. The American Company, in short, had followed in the eastern and southern sections of the country a course similar to that pursued by the Western Union Company in the west, and by purchase, consolidation and construction, controlled lines extending along the Atlantic coast and through the Mississippi and Ohio valleys.

In the purchase and consolidation of the telegraph companies the stock issued by the Western Union was exchanged at various rates. The American Telegraph Company received three of the Western Union shares for one of its own shares, and in the exchange for the United States Telegraph Company stock two shares of Western Union were given for three of the United States Telegraph stock. For the United States Pacific Telegraph Company two shares of Western Union were given for three of the United States Pacific stock. The consolidation was regarded as complete on July 1, 1866, when the principal companies were united. Other companies have since been purchased and leased, but have been paid for in cash or dividends.

The Western Union Telegraph Company now includes more than sixty different corporations, the charters and franchises of which it owns or leases.

The territory now covered by the lines of the company includes almost the entire inhabited portion of the Continent of North America. On the eastern coast the lines extend from North Sidney, Cape Breton, on the Gulf of St. Lawrence, to Brownsville, on the Rio Grande, and on the western coast from Los Angeles, Cal., to British Columbia. They reach

across the continent from the Atlantic to the Pacific Ocean, along the entire length of the Union Pacific Railroad, the Central Pacific from Sacramento to Elko. They reach every State and Territory in the Union, and supply Ontario, Nova Scotia and New Brunswick. The lines also have an exclusive connection with those in Newfoundland, Canada, Wisconsin and New Mexico, and with the Anglo-American and Cuba cables.

The consolidations which have resulted in the Western Union system mark an era in the progress of the telegraph in this country. By them the means of communication have been greatly increased, while between all the large cities and many of the less important towns a system of direct circuits has been established, which affords facilities for rapid and certain communication at all times. Instead of several repetitions of messages between the commercial centres of the country, as formerly, transmission is now in most cases direct and instantaneous; and the operation of this system over the territory covered by the lines is fast assuming the certainty and uniformity of mechanism. The company claim that not only has the public gained in time and in greatly increased facilities by these consolidations, but has received also the benefit of large reductions in the rates of both public and private despatches.

Among the many valuable patents which the company owns exclusively may be mentioned the Page patent for the set screw and retractile spring, which is regarded as the most valuable and useful mechanism in telegraphy. Phelps' printing telegraph, Stearns' and Farmer's duplex instrument for sending two messages at the same time over one wire, and Edison's quadruplex instrument for sending four messages over one wire—two messages each way—at the same time. The company also has a license to use the Colgate gutta-percha patent for insulators for cables and wires. It owns stock in the following corporations:

	Value.
Atlantic & Pacific Tel. Co. (72,010 shares).....	\$1,806,250 00
Gold & Stock Tel. Co. (47,810 shares).....	1,176,009 00
International Ocean Tel. Co. (10,385 shares).....	961,606 42
Brooks' Underground Tel. Co. (1,000 shares).....	95,000 00
Southern Bell Teleph. & Tel. Co. (843½ shares)....	84,325 00
Sundry other stocks and bonds.....	98,944 05
Western Electric Man'g Co. (500 shares).....	50,000 00

The present proposed increase of the capital to \$80,000,000 by the issue of stock is for the purpose of purchasing the stock of the American Union Telegraph Company and the Atlantic and Pacific Telegraph Company. The directors of the Western Union have recommended that \$15,000,000 of the increase be issued to the stockholders of the American Union, and \$8,400,000 to the stockholders of the Atlantic and Pacific Telegraph Company in the purchase of those two companies. The balance, \$15,585,445, is to be used as a scrip dividend to the holders of the Western Union stock.

Comparatively little can be ascertained of the extent of the lines and business of the American Union. They are mainly trunk lines between commercial centres on the great highways, and do not extend over any territory not reached by the Western Union lines. They are of new material, however, and increased business will render them necessary. The Atlantic and Pacific Company has about 30,000 miles of wire, extending from Ogden, U. T., to Bangor, Me., and from Detroit, Mich., to New Orleans, and connecting with the direct cable for Europe and with the Dominion Telegraph Company for all points in Canada. It has about 600 offices, and the gross receipts of the past year were about \$800,000.

It is claimed on the part of the companies that propose to consolidate that, by the laws of New York, of 1851, chap. 98, by the consent in writing of the persons owning two-thirds of the capital stock of the company, they may unite with any other incorporated telegraph company. And by the laws of New York, of 1870, chap. 568, a telegraph company may purchase other companies, or unite with them, and may make payments in its own stock or receive payments in the stock of the corporation to which the company may be sold, leased or conveyed, upon the agreement being ratified and approved by a three-fifths vote of its board of directors or trustees, and with the consent in writing or by vote at a general meeting duly called for that purpose of three-fifths in interest of the stockholders present or represented by proxy at the meeting. The three companies were all organized under the general laws of the State of New York, which permit them to run lines in other States and Territories.

The Western Union Telegraph Company is said to be the largest corporation of the kind that has ever existed, and has more extended interests and is of greater utility, and this without special privileges or Government aid. It is not like a railroad company having a special charter and special privileges and rights under it, but was organized and is conducted under general laws, which may be taken advantage of by any person or association, and its greatness is purely the result of individual enterprise.

Correspondence.

COMMUNICATIONS intended for publication must, to receive attention, be accompanied by the name and address of the writer, not necessarily for publication, but for the information of the Editor, and as a guarantee of good faith.

PHENOMENA OF ATMOSPHERIC ELECTRICITY.—A REPLY TO MR. DAVID BROOKS.

To the Editor of the Journal of the Telegraph:

THE statement upon which Mr. Brooks relies in his communication in the JOURNAL OF THE TELEGRAPH of Nov. 16 last, is, I submit, not a law, for the following reasons: It is known that weight determines nothing as to the capacity of a metal as a collector or conductor of electricity; neither does bulk, except in the sense of surface. As conductors, silver and copper are better than the heavier metal platina, and as an accumulator, a sheet of tinfoil is equal to a plate of platina of any thickness. Whatever attraction there is between bodies charged with electricity is in virtue of difference of potential. Area of the conducting plates, specific inductive capacity and thickness of the dielectric are factors, but weight or kind of metal has nothing to do with it.

Certainly, a cambric needle may have as high a potential as an oil tank. The fact is so well known that it goes without the saying. But it is well known that this is true only within limits. For a needle cannot be charged to the same potential as a tank, because of the difference of form. The electricity accumulates on the point of the needle, as it does on all points, whether lightning rods or blades of grass, until it reaches a certain density, when it passes off silently or as a spark. It has been demonstrated time and again, that bodies having sharp angles or edges or fine points cannot be charged to as high potential as a tank or any other large spherical or flat surface. If points do not possess this property it is difficult to see what constitutes the virtue of a lightning rod.

Doubtless the rods do not always prevent flashing, rather they help it in the manner shown, by supplying solid matter to be burned and make light.

They are very terrifying things, but when the flash is seen all direct danger from that flash is over. It may be said here that a flash is but a spark reflected by the clouds, and a streak of lightning is but a spark in motion. It appears to be a streak or one continuous line, many miles in length, owing to the fact that the eye, in consequence of what is known as persistence of vision, retains an impression of objects for at least one-tenth of a second; thus the whole track of the spark is seen before the impression of its beginning has left the eye. So that, if I may so phrase it, one sees lightning after it has passed out of sight. It is impossible then to say which way lightning moves, whether upwards or downwards, but from what we know of electricity there is no good reason for denying the back stroke. There may not be a return in the form of lightning, there certainly will be in the form of electricity, proper. All our knowledge makes it a logical necessity, besides it is a generally accepted fact.

Crying "fallacy" and "hobgoblin," then, is just thunder.

DAVID FLANNERY.

The Death of Albertus T. Langhorne, Chief Operator.

INDIANAPOLIS, IND., Jan. 7.

To the Editor of the Journal of the Telegraph:

THE death of Mr. Langhorne, chief operator of the Western Union Telegraph Company in this city, has cast a gloom over his numerous friends in this vicinity. His illness might be said to date from his youth upward. When about sixteen years old, a companion, about the same age, sitting behind him, accidentally discharged a shot gun, the contents of which carried away part of Mr. Langhorne's lower jaw. This occurred at Lebanon, Ky. He has never enjoyed robust health since. About one year ago he was attacked with hemorrhage of the lungs, and has been failing gradually ever since.

During his protracted illness he had the care of an ever anxious wife, father, mother, and sister, his fellow telegraphers and the masonic order, of which he was a member, who spared no pains to make his last days as cheerful as possible. On the evening of December 20th, the employees of the Western Union Telegraph Company held a meeting in the office of Supt. Wallick, who was called to the chair, and J. C. Dalton appointed Secretary. A committee consisting of Messrs. Smith, Butler, Chapin, Sickels and Moore, were requested to draft suitable resolutions.

The committee reported the following which were adopted:

Resolved, That in the death of our chief and comrade, A. T. Langhorne, the fraternity has lost a true and tried friend, and the Western Union Telegraph Company a faithful and competent employee, who served the corporation with distinguished ability, and was ever ready to help and encourage the deserving.

Resolved, That we tender to the family and aged parents of our comrade our most sacred sympathies in their great loss and solemn affliction, and that while we mourn his death, we will cherish the recollection of his many virtues and accomplishments.

Resolved, That we will suitably drape the operating-room for thirty days.

Resolved, That we attend his funeral in a body, and that a copy of these resolutions be furnished the family and the press.

A. T. Langhorne was born in Greensburg, Ky., December 10th, 1846, and departed this life December 19th, 1880, aged 34 years, 9 days. During the late war he was engaged in the government telegraph service. He came to Indianapolis about thirteen years ago, and has resided here ever since.

February 2, 1871, he was married to Miss Barbara Neiman, to whom have been born two interesting

children, who, with their mother, now mourn the loss of a husband and father. In all places Mr. Langhorne was faithful, prompt, diligent and successful. He was greatly respected by his superior officers and held in high esteem by his associates. His abilities as an electrician were marked; his practical knowledge, added to his natural ability, made him peculiarly valuable in the position he held.

His funeral was largely attended. About forty operators, the Masonic Society and a large number of other friends followed the remains to Crown Hill Cemetery. Messrs. Butler, Blake, Fuller, Wilson, Smith and Winder acted as pall bearers, all being telegraph employes, as well as members of the Masonic order. Services were held at the residence, and were conducted by Rev. Geo. L. Curtis, of the M. E. Church, whose remarks were most appropriate. The telegraph quartette rendered some fine selections. The aged parents, while grieving the loss of their son, deem it was all for the best, believing his spirit rests with Him "who doeth all things well." His life was insured in the Telegraphers' Mutual Benefit Association and other companies to the amount of nearly \$8,000. D.

The Second Division T. M. E. Association.

To the Editor of the Journal of the Telegraph:

I NOTICE, under the heading of "The Telegraphers' Mutual Benefit Association," in calling the attention of members who favor the Second Division, in your issue of the 16th inst., that this is the last appeal that you will make to members in its behalf. I am really sorry that you have come to that determination. There was, at the formation of this division, a very general feeling in its favor, and had the requirements for membership been more liberal and in accord with the principles of mutual benefit, there is no question but what it would have been met with alacrity. But it is not the past but the future that we must look after in this matter. If the principles on which associations of this kind are founded are correct there is just as much to be said in favor of a second division as the first, except that in the latter the friends of a deceased member receive a sum sufficient to pay the funeral expenses and a little over, while in the former the whole amount received would be applied for the support of the family, which judiciously invested, would help a widow for a long time, provided the membership can be brought up to, or nearly to that of the first division. Instead of abandoning the Second Division I would suggest that the subject should not only be agitated in the JOURNAL OF THE TELEGRAPH, editorially and otherwise, but that the Executive Committee should make an appeal through the agencies, even if the enthusiasm with which the Second Division was hailed when it was first promulgated cannot be revived. Limiting the amount of the beneficiary in the original association was done with a view of lessening the amount of assessments, as many members could not afford to pay so much money as would be called for provided a dollar had to be paid on the death of a member. No doubt there are scores of telegraphers who would be glad to increase their insurance and fully intended to do so, but have given it but little thought, except negatively, since the rebuff by the 90 and 9 superfluous questions, etc., which were required on the start of the Second Division. Since those requirements have been withdrawn and a more liberal policy has been adopted, I cannot but think that this division can be very materially increased in a short time, provided the JOURNAL OF THE TELEGRAPH and the Executive Committee put their united energies to the subject. Let

one grand effort be made, then, if it does not succeed, it will be time to let it drop.

VIGO.

Liberal Contributions to the Boyce Fund.—Presentation to J. A. Hinchman.

SAN FRANCISCO, CAL., Jan. 13.

To the Editor of the Journal of the Telegraph:

THE notice issued by the Secretary of the Telegraphers' Mutual Benefit Association asking for voluntary contributions for the family of the late John G. Boyce, has been received here and distributed among the members. It has been proposed to fix the amount of the subscription from those on this coast to a sum corresponding to what they would have been assessed had the claim been paid in the regular way. Fifty cents is the sum fixed upon, although many have given more, based on the calculation that an assessment of one dollar from all members is sufficient to pay at least two claims. Half the amount is therefore considered sufficient to realize the sum that would have been paid to the widow, had the claim not been rejected.

There have been but few changes among telegraphers on this coast during the past year. We have lost Mr. J. A. Hinchman, who has returned to you in New York. On the eve of his departure he was made the recipient of a handsome cigar case, mounted in silver, with a silver plate, on which was engraved "J. A. H., from his friends in S. F. office." Mr. Hinchman expressed himself highly gratified with this token of the friendship of those with whom he had been associated, and I have no doubt it will, to quote his own words, "aid him in recalling the many pleasant days he passed in California."

AGER.

Magnetic Phenomena.

CLAY CITY, ILL., Jan. 15.

To the Editor of the Journal of the Telegraph:

1. It is claimed that if a permanent magnetic rod or bar be introduced into a helix of copper wires a current of electricity will flow through the wire. What should be the length of the wire in the coil, and the size of the bar or rod, to produce a current equal to that of a Daniell's Cell?

2. As copper is neither attracted nor repelled by a magnet, will the bar meet with any resistance on being introduced or withdrawn?

A. R. K.

(Answer—1. The current produced by this introduction of a magnet in a helix is momentary only, and will vary with the magnetization of the bar, and the quickness with which it is introduced.

2. Yes. The currents induced by the relative movement either of two circuits, or of a circuit and a magnet are always in such directions as to produce mechanical forces tending to oppose the movement.)

The Chicago Electrical Society—The January Meeting—Prof. Carhart on the Ultra-Gaseous or Radiant Condition of Matter.

CHICAGO, ILL., Jan. 25.

To the Editor of the Journal of the Telegraph:

THE regular monthly meeting (the forty-fifth) of the Chicago Electrical Society was held at the Grand Pacific Hotel last evening. President G. W. Felton in the chair. The announcement that Prof. Carhart, of Evanston University, would deliver a lecture on Prof. Crookes's theory of the *Ultra-Gaseous or Radiant Condition of Matter*, attracted the largest and most intelligent audience the society has ever collected together. The audience, in fact, was far too numerous for either of the rooms heretofore

used for the meetings, and through the kindness of Mr. J. B. Drake, the proprietor, the rooms of the Appellate Court were placed at the disposal of the Society.

Prof. Carhart, than whom there is no more enthusiastic scientific student and investigator, in the West, had made very extensive and careful preparations to illustrate his lecture. Through Prof. Crookes he had obtained from that gentleman's own manufacturers a set of Crookes' tubes, the first ever shown to an American audience, to illustrate the subject of his discourse; and the success of every experiment, as well as their application to the points illustrated, was most perfect and satisfactory. The lecture occupied until ten o'clock in its delivery, but, notwithstanding its length, the audience was intensely interested until its close; manifesting their interest and appreciation by repeated rounds of enthusiastic applause. The difference between the well-known Geissler tubes and the Crookes tubes was so perfectly described and illustrated, that many who, previously, were skeptical in regard to Prof. Crookes' discoveries, were convinced of their reliability, and were ready to receive the "Radiant Matter" theory as something novel and correct.

The length of the lecture and the impossibility of compressing it into a synopsis sufficiently brief for your columns, and at the same time do justice to the lecturer and the subject, compels the omission of more than this brief and unsatisfactory reference to it. In every respect the lecture was an entire success, and its delivery and reception is highly creditable to the scientific enterprise of the Society and the city.

The members of the Society are to be congratulated upon the success which attends their efforts to maintain a scientific association in this city, which shall worthily represent its culture and intelligence. It is doing an excellent and valuable work, and doing it as successfully as any scientific society in the country.

The next meeting will be held on the third Monday in February.

H.

Death of A. G. Stolbrand.

CINCINNATI, O., Jan. 27.

To the Editor of the Journal of the Telegraph:

A. G. STOLBRAND died in this city, of consumption, on the morning of January 20th. He came to the Cincinnati Western Union office about a year ago, and although then in feeble health, being endowed with remarkable will power, endured his affliction composedly and without complaint. He was a most attentive and faithful first-class operator, working the Baltimore quadruplex with credit to himself and the service.

On Saturday, the 15th inst., he went home, feeling unable to continue work, and died on the following Thursday. His poor health having been a heavy expense to him, he was unable to make proper provision for his wife and child, but the employees in the office, with characteristic generosity, donated abundantly to provide for the proper interment of his mortal remains in Spring Grove Cemetery, and to secure passage for his little family to the home of Mrs. Stolbrand's mother, Mrs. Johnson, at Newark, N. J. The Baltimore office also kindly donated thirty dollars towards their relief. Mrs. Stolbrand expressed her sincere gratitude to those who so kindly rendered assistance in her time of need.

Mr. Stolbrand, unfortunately, was not a member of the Telegraphers' Mutual Benefit Association, and his sudden death should be an incentive to all telegraphers, while in health, to avail themselves of the advantages afforded by that association to provide for those dependent upon them in their time of affliction.

M. J. C.

Journal of the Telegraph.

PUBLISHED SEMI-MONTHLY AT 136 BROADWAY.

J. N. ASHLEY,

EDITOR.

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NEW YORK, FEBRUARY 1, 1881.

TELEGRAPHIC CONSOLIDATION.

The proposed consolidation of the three principal telegraph companies has been made the occasion of denunciation and opposition, which a proper presentation and consideration of the facts will show to be unwarranted. These consolidations and combinations have been in progress for many years, and from the circumstances and nature of the business are inevitable. Their results have been beneficial to the public as well as to the capital and labor employed; and have afforded to this country a telegraphic system and service superior to that of any other.

We have not space to detail the steps by which the telegraphs of the country have been brought under a single and harmonious management, from the time when they were divided among numerous small companies, acting independently of or competing with each other. That condition of affairs, dividing responsibility, causing uncertainty and delay in the transmission of business, largely increasing its cost to the companies and the public, and making it unprofitable to stockholders and employes, notwithstanding the high rates necessarily exacted, early led to efforts for improvement. Contracts for amicable working and connection between the companies and lines were first tried, but proved ineffectual. At length it was decided that the system could be economically operated and made efficient, reliable and remunerative only by combining existing lines and extending them so as to practically cover the entire territory under one management. To accomplish this required skillful manipulation and patient and

persistent labor. It was undertaken upon a well and carefully devised plan by the managers of the Western Union Telegraph Company, and has been successfully carried out against obstacles and impediments which at times seemed nearly insurmountable. The wisdom of this policy has been shown by its results. The telegraphic system of the country has been systematized and extended as would otherwise have been impossible; improvements have been originated and adopted which have largely cheapened and facilitated the service; inventors have found a ready customer for inventions of importance and real value; the labor employed has been more satisfactorily rewarded; and the business has been made remunerative to the capital invested. At the same time the charges for service rendered to its patrons have been largely reduced, these reductions within the last twelve years amounting to 69 per cent., and are still being constantly made, whether the company has to encounter competition or practically has the field to itself. The idea which has been and is being so constantly asserted that the Western Union Company is, or is intended to be, a grinding and oppressive monopoly in view of these facts, which cannot be controverted, will be seen to be absurd.

Another fact which is not generally known to the public, but which has had an irresistible influence in bringing about the late consolidations, is that competing companies have invariably proved to be unprofitable. This has become so well understood that when such companies are established calculations are at once made by those familiar with the business as to the number of months that will elapse before they will be gathered into the Western Union fold.

It is asserted by the opponents of consolidation that it is to be followed by a general increase of charges. This we contradicted by authority in our last number. It is not proposed that any present rate shall be increased except in a few cases where it is now less than twenty-five cents. The economy which will be effected by combining the management and operation of the lines will be an important item in the expense of conducting the business, and as further improvements in the service are introduced, will enable the company to continue its policy of cheapening its cost to the public, while at the same time making it even more efficient, prompt and reliable.

In regard to the increase of capital consequent upon these consolidations, it should be understood that it has a solid basis, and is not unwarranted by the condition of the business. It is merely proposed to capitalize, so that they will be available to the stockholders, the amounts expended from time to time in acquiring property, which belongs to them, but which heretofore they have had nothing to represent. The capital proposed will not be out of proportion to the value of the property and business, and is very moderate in comparison with that of many other corporations whose stocks are sold at higher rates, and whose earning capacities are even proportionately less than that of the telegraph. There is no doubt of the ability of the company to

pay fixed charges and satisfactory dividends upon the stock, and this while at the same time doing the business at reasonable rates.

Proposed Formation of a New York Electrical Society.

It is with much pleasure that we give space to the following call for a meeting of electricians and telegraphists to consider the subject and determine on a plan of organization of an Electrical Society in this city.

We have repeatedly urged action in this matter, but heretofore there has been no effective response. We trust that now that the first step has been taken a general interest will be manifested, and that there will be a large attendance at the preliminary meeting, on the evening of the 8th inst. From the number of telegraphists employed in this city and its immediate vicinity, it ought to be possible to organize a very large and influential society, and one which will prove useful and valuable. The opportunity to do this is now afforded, and we trust will be generally responded to:

As there seems to be a desire among the telegraphers in and around this city for an Electrical Society, the undersigned assume the responsibility of calling a meeting of all persons connected with the telegraph and telephone, interested in the subject, to be held at the United States Hotel, corner Fulton and Water streets, New York, Feb. 8th, 1881, at 8 P. M.

This is intended merely as a preliminary meeting to discuss the subject and determine on a plan of organization.

P. J. TIERNY.	F. W. CUSHING.
D. R. DOWNER.	A. T. CRELMAN.
J. W. MORELAND.	J. H. DWIGHT.
E. T. BARBERIE.	J. B. SABINE.
E. A. LESLIE.	W. B. WAYCOTT.
F. STANTON.	

A Valuable Library Opened.

THE Society of Telegraph Engineers, of London, at its recent annual meeting added to its title "and of Electricians," so that it will hereafter be known as the "Society of Telegraph Engineers and of Electricians," which is considered as more appropriately and fully indicating its character and objects. The work of cataloguing the Ronalds' Library, which was left to the Society in trust, has been completed, and the Library of the Association has been opened under very liberal arrangements. It is available to members of all Scientific bodies, and (on application to the librarian) to the public generally. It is to be used for reference only, and no books, pamphlets, etc., are allowed to be taken from the Library.

The Society is in a very prosperous and flourishing condition, and is doing a good work.

An Electrical Invention Anticipated.

In another column we print an account of an electrical lift (elevator) invented and exhibited by Dr. Siemens. This is another instance of reinvention, similar arrangement having been originated and exhibited in San Francisco, in the winter of 1878, by Mr. Stephen D. Field.

The elevator referred to was publicly exhibited in

operation at the office of the Western Electric Light Company for about six weeks, and a full description of it was printed at the time in the *San Francisco Chronicle*.

Mr. Field filed a caveat for his invention in the Patent Office, but never took out a patent therefor for reasons satisfactory to himself.

Bound Volumes for Sale.

As usual, we have had a few copies of the volume of the *JOURNAL OF THE TELEGRAPH* for 1880, substantially bound, and parties who desire to obtain them will be supplied upon forwarding \$3 to this office. As the number is very limited, to secure a copy application should be made at once.

We have also a few copies bound of Vols. IV, V, VI, VII, IX, and XII, which will be disposed of at the same price per volume.

Two complete sets of *The Telegrapher* can also be obtained on application to the editor of this paper, upon terms which will be made known to the parties desiring to purchase. Complete sets of *The Telegrapher* are difficult to be obtained, and are yearly becoming more valuable. Parties desiring to secure them should at once avail themselves of this opportunity to do so.

LITERATURE.

The Popular Science Monthly.

THE February number of this excellent magazine is especially attractive. The first article is on "Political Differentiation," by Herbert Spencer, in continuation of his interesting and instructive treatise on the "Development of Political Institutions." In this chapter he elucidates the growth of those class distinctions which form so large a part of the constitution of civilized societies. The article by Mr. Charles Marshall Lungren on "Domestic Motors," in which he describes gas and electric engines, is very interesting. F. L. Oswald, M. D., continues his series of articles on "Physical Education." In the present number he deals with stimulants and all kinds of irritants and provocatives which are so extensively employed with proper food. Professor Carhart contributes a clear and practical article on "Atmospheric Electricity." The other articles comprised in this number are "Origin of the Plow and Wheel Carriage," by E. B. Tylor, F. R. S., illustrated; "Horses and their Feet," by Sir George W. Cox; "The value of Accomplishments," by William A. Eddy; "Darwin on the Movement of Plants," by Eliza A. Youmans, illustrated; "Optical Illusions of Motion," by Sylvanus P. Thompson, B. A., D. SC., illustrated; "Evolution of the Chemical Elements," by Lester F. Ward; "Only a Vine Slip," by Thomas G. Appleton; "The November Meteors," by Professor Daniel Kirkwood; "Prehistoric Science en Fete," a lively paper on the last Congress of Anthropology at Lisbon, and a "Sketch of Count Portales" with portrait.

The departments are as usual full and interesting. D. Appleton & Co., 1, 3 and 5 Bond St., New York.

John Swinton's Travels.—G. W. Carleton & Co., New York, Publishers.

We have received from the author this little work, which gives in an interesting and readable form the results and deductions of forty days of travel and observation in France and England. Mr. Swinton

is an able and experienced writer, and when he travels, keeps his eyes and ears open. Whether the reader agrees with his conclusions or not, he cannot fail to be interested and instructed by a perusal of this work.

The Telegraph.

A STORM DISASTROUS TO TELEGRAPH LINES.

General Prostration of Telegraph Wires in New York and its Vicinity.—Telegraphic Communication Temporarily Interrupted.—A Linesman Killed.

FRIDAY, January 21st, was a day long to be remembered in telegraphic annals. For the first time in many years telegraphic communication was temporarily entirely suspended between this city and the rest of the country, and its inhabitants relegated to primitive modes of sending and receiving information. This unusual and anomalous condition of affairs was caused by the effects of a storm of rain, sleet and wind, which for the time being wrecked and interrupted the multitudinous wires which overhang the city, and prostrated poles and fixtures in many localities within the city and a radius of about thirty miles, of which it was the centre.

A somewhat similar but less disastrous experience occurred on Sunday, January 5th, 1873. This was also caused by an accumulation of sleet upon the wires; but the damage was mainly done in the city, and as the number of wires suspended over the city at that time was probably not more than half what it now is, the damage done was much less serious than in the present instance. Since 1873 there has been no such serious interruption of telegraphic communication until now, and it is to be hoped that it may not soon occur again.

The storm which proved so disastrous commenced in this vicinity about one o'clock on Friday morning with a light fall of snow. Within an hour or two thereafter this changed to sleet and rain, and as the temperature was below the freezing point, these froze upon the wires, and gave unmistakable indication of what was in store should the storm continue. When daylight came the wires were seen to be coated with ice, and as the day advanced the sight presented by them was a most beautiful one, the wires gleaming through the falling rain and mist like cords of silver. It is safe to say that, beautiful as was the scene presented, it had small attraction for telegraphists, who well appreciated the probable outcome of the exhibition. About nine o'clock a drizzling rain set in, which fell steadily until about three o'clock in the afternoon. During most of the time a heavy wind was blowing, at one time attaining a velocity of forty miles per hour, which completed the disaster which the accumulation of ice that loaded the wires had initiated. The wires in the city commenced to give way before 10 o'clock. The telephone lines, which are largely of small sized wire, and the fixtures of which were not as strong or as effectively secured as those carrying larger wires, first began to yield. These falling telephone wires fell across the other lines, interrupting communication upon such wires, and adding to the already dangerous strain upon them. By ten o'clock the wires were snapping and poles and fixtures coming down in all directions, and this state of things continued until toward night, when the storm abated. A large number of poles were broken off and in some sections of the city, notably in portions of West and Canal streets, were completely prostrated. The linesmen of the different compan-

ies were out in force and busily employed, but while the storm continued had about all they could do to keep the broken wires, poles and fixtures out of the streets, and to secure or remove them from buildings and housetops where they were likely to endanger life and property.

Communication over the city lines being suspended, it was not known how extensive the damage outside of the city was, but occasional reports from other sections indicated that it was likely to prove serious. A visitor to the operating rooms of the Western Union and other principal telegraph companies missed the steady roar caused by the simultaneous operation of large numbers of instruments which so forcibly strikes upon ears unaccustomed to it. The unusual stillness was only broken by an occasional click as an operator here and there attempted to "raise" a station, efforts which it is needless to say were unsuccessful.

At this time, and for several hours, the wires presented a most beautiful appearance. The ice which encircled them was nearly an inch in thickness, so that the diameter of each wire was nearly two inches. From these fringes of icicles hung down, which added materially to their picturesque appearance. The weight of these ice-encrusted wires was enormous, far beyond what the poles and fixtures were intended to sustain, and when to this was added the swaying caused by the wind, the catastrophe which ensued was inevitable. Every few minutes a wire would be seen to snap and fall in graceful curves, adding to the already apparently inextricable tangle. For two or three hours the large fixture upon the roof of the Post Office building on the Broadway side, which carries a large number of wires, attracted much attention. This had been so substantially put up that it yielded very slowly to the weight which it sustained and the pressure of the wind. It gradually gave way, however, and finally succumbed and lay flat, projecting over the eaves, destroying a part of the ornamental railing which surrounds the roof of the building as it fell. The numerous wires crossing the building had in the meantime been tied together and lashed to it temporarily, to avoid the necessity of cutting them.

By noon the wires all over the city, and especially upon the main routes, where they are very numerous, had become a tangled mass, apparently inextricable. Many poles had already fallen, and many more seemed likely to share the same fate. The transit of trains upon the elevated railroads was at times delayed from the falling of wires upon the track. Of the 267 wires of the Western Union Company running out of the city, and the hundred or more city wires of the company only two were working; one to the United States Hotel in Fulton street, and the other to Twenty Third street. The wires of the other telegraph companies were in no better condition.

The service of the Metropolitan Telephone and Telegraph Company was practically suspended. The Gold and Stock Telegraph Company's wires, although considerably injured, fared somewhat better than the others, most of the down-town circuits to stockbrokers' offices being kept in operation during the business hours. The lines of the American District Telegraph Company and of the Law Telegraph Company were also generally interrupted, and business for the time nearly suspended.

The Police and Fire Telegraphs shared in the general wreck, and their operation was entirely suspended. With the high wind which prevailed, the danger, should a fire take place, with the machinery for summoning and directing the fire apparatus promptly to the locality disabled, was seen to be imminent. To guard against this as effectually as

possible the Chiefs of the Fire Battalions were ordered to send out men on horseback to patrol the streets, and should a fire occur, at once summon the nearest engines to the spot where their services were required. The police were also directed to employ special vigilance in this respect. The old fire towers, formerly so important a part of the machinery of the fire department, but which have long been disused, were again manned, with orders to the lookouts to strike the number of districts where fires might be discovered on the fire bells, as was formerly customary, to direct the firemen to the location. Fortunately no serious fire occurred, and the city was spared the horrors of a conflagration, to the danger of which, under the circumstances, it was seriously exposed.

In the evening of Friday communication with the South was opened up via Elizabeth, N. J., from which place one or two wires were found to be in workable condition; and east via Williamsbridge on the Harlem road, from which place also it was found practicable to communicate. Relays of operators were despatched to these places, and messages sent to and from them by train. Saturday forenoon a few wires were got in condition to be worked from the main offices of the different companies, and from this time the condition of things slowly but steadily improved under the energetic efforts which were persistently made to repair the damages.

In Brooklyn and Jersey City the telegraph lines were also generally prostrated and telegraphic communication in any direction suspended. The destruction of poles as well as of wires was very great. Communication between New York and Brooklyn was cut off by the breaking of wires running over the bridge.

The storm was especially damaging in Jersey City, Hoboken, Newark, and other parts of Hudson and Essex Counties, New Jersey. The police and fire alarm telegraphs in these and other places in New Jersey were badly damaged. In Jersey City the lines of the New Jersey Telephone Company were largely destroyed, and nearly every private wire in the city more or less injured. Outside of New York City and Brooklyn the principal damage done was in New Jersey, where the storm and its effects appear to have been most severe. At Paterson and Passaic City the telegraph lines and the lines of the telephone companies were generally prostrated. The railroad lines fared no better than the others, and for the time the roads centring at Jersey City had to be operated without assistance from the telegraph, and railroad officials and train despatchers had an opportunity to realize the benefit derived from telegraphic coöperation in conducting railroad business.

The storm and the suspension of telegraphic communication seriously interrupted general business, and in some lines entirely suspended it. The vital importance of the telegraphic service to the business interests was very forcibly demonstrated.

Considering the proportions of the disaster and the crowded condition of the streets it is remarkable that so few serious accidents to life and limb occurred from the wreck of so many telegraph lines. Only one fatal accident occurred. Richard S. Byrne, a linesman, employed by the Western Union Telegraph Company, on Friday climbed a pole at Flushing and Carlton Avenues, Brooklyn, to clear the wires of ice. While thus employed the pole gave way and he fell with it to the ground. One leg was broken and he suffered severe internal injuries from which he died in a short time after his removal to the City Hospital. Mr. Byrne was 24 years of age, and lived at No. 388 West Twenty Seventh street, New York.

Even while the storm was in progress the different telegraph companies had gangs of men out, endeavoring to repair the damage done. Coils of wire and linesmen could be seen at every corner. Every man available who could handle poles and wire found ready employment, and under the vigorous efforts at once initiated order was slowly evolved from the chaos which had been caused by the storm. All day Friday and Saturday the work was energetically pressed, and on Saturday afternoon each of the three principal companies had some of its main wires in operation; and on Sunday material progress was made in the work of restoration, especially in the cities, where it was greatly facilitated by the quiet which prevailed in the streets, incident to the day. The work, of course, was only done temporarily, in order to get the more important lines in operation as speedily as possible, leaving to a future time the task of thoroughly repairing and rebuilding. By the time, however, that this account reaches our readers most of the damage will have been repaired and the telegraphic service permanently and thoroughly re-established.

Approving the Consolidation.

MEETINGS of the directors of the Western Union, American Union, and Atlantic and Pacific Telegraph Companies were held in this city on Wednesday, January 19th, to take action upon the proposed consolidation of these companies.

The directors of the American Union Telegraph Company assembled in the president's office, corner of Broadway and Cedar streets, at eleven o'clock A. M. All the directors were present, except Levi Z. Leiter, of Chicago. The agreement was read and approved unanimously.

The meeting of the Western Union directors was called for twelve o'clock noon, at the Executive Office of the Company, and twenty out of the twenty eight members of the Board were present. The agreement was also unanimously ratified by the Board.

At two o'clock P. M. a meeting of the trustees of the Atlantic and Pacific Telegraph Company was held at its Executive Office, with all the members present. The agreement was approved unanimously.

The stockholders' meetings of the three companies to act upon the agreement are called for February 5th.

American Speaking Telephone Company.

At a meeting of the stockholders of the American Speaking Telephone Company, held January 20th, the following gentlemen were elected directors for the ensuing year: George B. Prescott, Norvin Green, Tracy R. Edson, James H. Banker, H. McK. Twombly, Samuel S. Barger, Elisha Gray, E. W. Andrews, Anson Stager, John Van Horne, and Augustus Schell. At a meeting of the Board of Directors officers were elected as follows: George B. Prescott, President; Norvin Green, Vice President; L. E. Lefferts, Secretary; and R. H. Rochester, Treasurer.

The American Telegraph and Cable Company.

A CERTIFICATE of Association of the American Telegraph and Cable Company, organized under the statutes of New York of 1848, and the acts amendatory thereto, affecting telegraph companies, has been filed at Albany. The company is organized for the purpose of "owning, controlling, purchasing, leasing or otherwise acquiring, using, operating and maintaining a land and submarine line or lines of electric telegraph, partly within and partly without the limits of the State of New York." The

capital stock of the company will be \$20,000,000, with power to increase the same to such amount as may be necessary to build and construct the lines of telegraph and cable contemplated by the company, and the term of the association is fixed for fifty years from the 18th of January, 1881, to the 18th of January, 1930, and its headquarters are to be in the city of New York.

The Atlantic Cable Combination.

THE arrangement between the Anglo-American, Direct United States, and the new French Cable Companies for a division of business and receipts has been duly ratified by each of the companies. It is understood that the agreement is in the nature of a traffic arrangement, by which the receipts of the three companies are pooled, and the division of the gross receipts to be in the proportion of 61 per cent. to the Anglo-American, 23 per cent. to the Direct United States, and 16 per cent. to the French Company.

The Photophone.

THE opinion is gaining ground, especially among French savants, that the musical sounds produced by Professor Bell in disks of various substances, such as mica, India-rubber, metal, and wood, by holding them in the path of a rapidly interrupted beam of light, are really due to heat and not to light. Radiophonic notes, such is the new term, have been obtained by M. Mercadier from ordinary gas lamps without employing lenses to concentrate the interrupted beam, by simply bringing the receiving disk near the source. Even a plate of copper heated to a bright red heat produced very distinct musical tones, which gradually died away as the plate cooled to a dull red followed by obscurity. The fact that when the receiving disks were coated with silver on the side next the light the effects were feeble, and that when coated with absorbent lamp-black they were strong, would seem to tell against Professor Bell's conclusion that the sounds were due to light.

It is a curious fact that when the radiometer was first brought out by Dr. Crookes he intimated his belief that its rotation was due to the impact of light waves; but heat is now known to be the cause of the motion.

The Duplexing of Submarine Cables.

IN duplexing long submarine cables it is found that one great point to be aimed at is to carefully reproduce in the artificial cable which balances the working cable an exact imitation of the first three hundred miles or so at each end of the working cable, both as regards the resistance and electrostatic capacity of each consecutive mile of cable in its proper relative position; and for this purpose the "Section Books" containing the tests of each mile of cable before it is added to the cable are consulted, and the artificial resistances and inductive resistances forming the artificial cable are made to correspond, the remaining portion of the working cable being represented in the artificial cable more in the gross than in exact detail. This shows that the labor expended in careful compilation of exact tests during manufacture is not thrown away, but is becoming of increased importance. So sensitive is the balance to this exact representation of the first few hundred miles of cable that even a slight decrease in insulation at one spot within that distance can only be rebalanced by a similar decrease of insulation at exactly a corresponding spot along the artificial cable, and this seems to open out a new and accurate method of determining the dis-

tance and magnitude of a small fault of insulation. In fact, for finding the distance of a fault in a cable we should have for one side of the bridge an artificial cable having electro-static capacity and resistances exactly similar to the cable under test when perfected.—*The Electrician*.

Atmospheric Electrical Disturbance.

AN atmospheric electrical disturbance, locally known as the annual electric storm, raged at Omaha, Nebraska, on the 5th and 6th ult. During that time the efficiency of the lines was very much impaired, and at times were practically useless throughout that region. The storm was accompanied by snow and high winds over eight hundred miles, between Omaha and Green River. The intensity of the storm is shown by the fact that when the telegraph key was opened by the operator a steady electric light burned at the connecting points. It is now practically over, and the wires are again open. L. H. Korty, chief operator of the Union Pacific Telegraph lines, has kept a record for years, and, with but one exception in twelve years, this storm occurred on the 5th, 6th or 7th of January. It is believed that the entire Rocky Mountain region is visited by them. These storms have attracted the notice of electricians and scientific men generally.

Introduction of Electric Railroad Signals.

THE Cincinnati Southern Company are about to put the Union Electric signal in a number of tunnels, and the Nashville, Chattanooga & St. Louis Company have put it in their tunnel in Nashville. This signal is also being put on the Little Miami and the Pittsburg, Cincinnati & St. Louis. The Pittsburg, Fort Wayne & Chicago have put this company's block and signal in their Allegheny City yards. Fourteen miles of the Chicago & Western Indiana are being equipped. The Chicago, Milwaukee & St. Paul are putting in the interlocking signal. The Fitchburg is putting in the signal from Belmont to Waltham.

Foreign Telegraphic Notes.

MR. FAWCETT, Postmaster-General, has declined to receive a deputation of telegraph clerks (operators) on the subject of granting an advance of salaries.

A project for constructing an electric telegraph from end to end of Africa has the sanction of the African Exploration Committee of the Royal Geographical Society. A report made to that society on the subject speaks in sanguine terms of its feasibility, with particulars of probable cost and revenue. The Egyptian Government at one end is prepared to carry forward its line, which already extends southward some distance beyond Khartoum as far as Gondokoro. At the other end the government of the Cape Colony is expected to extend the existing line in British South Africa to Pretoria, in the Transvaal.

The first public telephone line in Germany was opened recently by the Berlin Telegraph Office.

The Government of India have requested the Indian Chamber of Commerce to furnish their opinions as to the inauguration of the telephone system in India. This request is based on the application of the Bell Telephone Company for permission to work the Bell and Edison system in India.

In the Transvaal (South Africa) the telegraph wires beyond Heidelberg have been cut by the Boers. Mr. Ilberry, inspector of telegraphs for that district, made his escape. The two Murrys were taken pris-

oners. Later advices state that telegraphic communication with the Transvaal is entirely interrupted.

A message from Melbourne, Australia, to London, passes over 13,695 miles of wire.

The revenue returns for the quarter ended Dec. 31, 1880, show an increase of £195,000 in the receipts for telegraph service of the British Post Office.

The Electrician states that the application from the public for telephonic facilities under Government control in England are very numerous.

A tablet has been erected in the Shooters Hill Cemetery by the Staff of the Eastern Extension Telegraph Company, in the memory of H. T. Fisher, for some years the electrician of the Company.

The Steamship *Hooper*, belonging to Hooper's Telegraph Works Company, has taken in 400 miles of cable with Hooper's coil, at the Company's Works, Millwall Docks, to be laid along the coast of Cuba, for the Cuba Submarine Telegraph Company.

A consular report just issued states that on August 25, 1879, the rate of messages transmitted by cable from Algiers to Marseilles was reduced from 20c. to 10c., that immediately the number of messages doubled, and the receipts, in spite of the decrease of fifty per cent. in the rate, exceeded what they were before.

The number of messages passing over the lines of the Submarine Telegraph Company during the month of December, 1880, was 2,284, estimated to produce £2,300, against 2,637 messages producing £3,317 in the corresponding month of 1879.

The *Telegraphic Journal*, of London, of January 15th, says that, as yet, no notice of appeal against the judgment in the case of the Postmaster-General against the Edison Telephone Company has been given. It seems probable that no appeal will be taken.

The postal department of Switzerland is authorized to establish a system of telephonic communications at Basle, where 62 subscribers have been already obtained. The department is also authorized to establish telephones in any towns where the number of subscribers is sufficient.

The Direct Spanish Telegraph Company's cable was on January 12th, connected direct between Falmouth, England, and Bilbao, and congratulatory messages were interchanged between the Mayors of Falmouth and Bilbao, and Mr. Cox, the Falmouth postmaster, and Senor Mora, the central Spanish director of Madrid.

The several West India telegraph cables are now all in working order.

The receipts of the French telegraphs from all sources for telegraphic services, last year, amount to 27,008,000 francs (about \$5,300,000).

The Cuba Submarine Telegraph Company will pay on the ordinary shares, after providing for the preferred shares, a dividend at the rate of 5 per cent. per annum for the six months ended December 31, 1880, adding to the reserved fund £2,500.

The board of the Direct United States Cable Company have decided upon the payment of an interim dividend, at the rate of 5 per cent. per annum, for the quarter ended Dec. 31, 1880.

The engines of the cable-laying steamship *Kangaroo* recently ran the 9,500 miles from New Zealand to St. Vincent without stopping.

JUDKINS, describing his first visit to a telephone exchange, says they were all jabbering like hello.

This year it makes no difference which way you write it—1881—backwards or forwards. In 1771 the same thing occurred, and it will be repeated in 1991, but it is not likely that it will interest us then!—*Portchester Journal*.

Miscellanea.

TELEGRAPHIC LITIGATION.

Rufus Hatch against the Western Union Telegraph Company, the Atlantic and Pacific Telegraph Company, Jay Gould, Sidney Dillon, Thomas T. Eckert, and others.

In this case the complaint of the plaintiff, a stockholder of the American Union Telegraph Company, for himself and other stockholders who may join him in the action and be made parties thereto, charges an unlawful combination and agreement of the directors of the several companies for the purpose of bringing about an amalgamation of the interests, stocks, properties and profits of the telegraph companies, defendants.

On the application of Messrs. Sewell & Pierce plaintiffs' attorneys, to Judge Barrett of the Supreme Court, January 20th, a temporary injunction was granted restraining the consolidation of the companies above named, and an order made for the defendants to show cause at a special term of the Court, to be held on January 24th, at the chambers thereof at the Court House in the City of New York, why the order or some similar or other order should not be continued during the pendency of the action.

The hearing on the order to show cause commenced January 25th before Judge Barrett in Supreme Court chambers.

Many affidavits were presented on the part of the defendants refuting the affidavits of the plaintiff on which the *ex parte* temporary injunction had been granted, some stating "that Mr. Hatch had offered for sale the process of the Court, and could not be considered as sincere in his present proceedings. Mr. Robert Sewell, counsel for the plaintiff, read an additional affidavit from the latter, and submitted the case on this affidavit and the papers already before the Court. Mr. Wager Swayne, on behalf of the American Union Co., read affidavits of the officers and directors, denying the transfer of any rights or property of the American Union Co., except with the assent of the stockholders and directors, and denying any "conspiracy or combination" on the part of the directors to defraud the stockholders, and asserting that the consolidation would increase to the benefit of all according to their interest, and to the public at large; and showing that the proposed consolidation had been authorized by 73,354½ shares out of a total 100,000 shares of the company.

Washington E. Conner, in his affidavit, read by Mr. Swayne, details three interviews between the plaintiff and himself in regard to the suit, at the second of which, January 19th, he alleges that Mr. Hatch told him (Conner) "that he was displeased at being left out of what he (Mr. Hatch) called the deal;" that he was "short" some 500 shares of Western Union Stock; that if Mr. Conner or Mr. Gould, or some one for them, would take his American Union stock off his hands at the price Western Union stock was then selling at in the market, he would stop all legal proceedings.

Mr. Jay Gould, in his affidavit, states that the plaintiff represented to him that the best interests of all of the stockholders of the American Union Company required that an arrangement be made for the consolidation of said company with the Western Union, or at least for the working in joint interest of both properties. That the suggestions of complainant as to the advantage to both companies from any such arrangement seemed to him to be well founded, and largely influenced him as a direc-

tor and a stockholder in the American Union Company to vote for and consent to the arrangement which has since been made.

Everett P. Wheeler, as counsel for the Atlantic and Pacific Telegraph Company offered the affidavits of A. B. Chandler, President, and William H. Baker, Secretary, on behalf of that company, denying that when the American Union Company was established the Western Union had a monopoly of telegraphy within the United States, or that the effect of its establishment was to lower to any considerable extent the rates previously charged by the other companies.

Mr. Grosvenor P. Lowrey followed on behalf of the Western Union Telegraph Company, and presented the affidavits of Dr. Norvin Green, President, John B. Van Every, Acting Vice-President, William Holmes, Superintendent of the Tariff Bureau, and the affidavits of Edwin D. Morgan, Augustus Schell, Samuel F. Barger, and Hamilton McK. Twombly, directors of the company.

Dr. Green, in his affidavit, denies the "conspiracy or combination" alleged, and also the allegation that the consolidation is for the purpose of increasing the rates of telegraphing, and asserts that, in his belief, it will have the contrary effect. He also sets forth that the agreement was made in strict compliance with all the requirements "of the statute," that "the expressions of opinion in the complaint and the affidavit of Rufus Hatch concerning what constitutes the value of telegraph property are fallacious and misleading," that the poles and wires and material "plant" of telegraph companies constitute only a part of the value of such property when established. His affidavit is concluded with this statement:—"In my opinion the actual property now held by the Western Union Company, together with that which it will acquire by said agreement, fully justifies the increase of its capital stock stipulated in said agreement."

Mr. Van Every details the manner in which the capital stock of the company was increased through consolidations and purchases of other lines and companies, to \$41,073,410 in 1868, at which it has since remained. He also asserts that since 1868 the Company has made expenditures for new property to the amount of more than \$16,750,000.

William Holmes testifies that the rates of the Western Union Company have been reduced from time to time with reference to competing lines, but much more frequently without any such reference, and that their reduction has varied from 5 to 75 per cent. He asserts that the Western Union Company continued to reduce its rates after the organization of the American Union Company at points where the latter had no competing lines.

The directors mentioned make the affidavit of President Green their own, and positively deny a conspiracy or consolidation to defraud the stockholders, or for any other illegal purpose.

Mr. Sewell, on behalf of the plaintiff, read the affidavits of Abraham Allen and seventeen others, in answer to those read on behalf of the companies. These affidavits assert that a consolidation of the companies would have the effect to interfere with the facilities for telegraphing to different parts of the United States, which would be injurious to trade and commerce.

The papers being now all before the Court, Mr. Sewell opened the argument for Mr. Hatch. He was followed by Mr. Wager Swayne for the American Union Company.

Without the conclusion of Mr. Swayne's argument the hearing was adjourned until the next day at 1.30 P. M.

On Thursday, Mr. Swayne concluded his argu-

ment, and Messrs. Everett P. Wheeler for the Atlantic and Pacific, and Grosvenor P. Lowrey for the Western Union Companies, submitted lengthy arguments in opposition to the defendants case.

At the conclusion of Mr. Lowrey's argument, the hearing was adjourned until Friday P. M., when Judge Porter will conclude the argument for the defendants, and will be followed by ex-Judge Fullerton, who will conclude the argument for the plaintiff.

On Thursday Judge Dillon, who appeared for the American Union Telegraph Company, continued the argument for the defence, and at the close of his argument Mr. Lowrey read the affidavit of Mr. John Van Horne, a vice-president of the Western Union Company, in reply to the eighteen affidavits read by Mr. Sewell in regard to the effect which the proposed consolidation would have upon the facilities of telegraphing enjoyed by the public. The substance of the affidavit was that the facilities would be greatly increased by the consolidation.

Judge Porter then made the closing argument on behalf of the Western Union Company. Judge Porter finished his argument at about half-past four o'clock, when the hearing was adjourned until Friday, at 1:30 o'clock, P. M., when Judge Fullerton was to make the final argument for the plaintiff.

On Friday Judge Fullerton made the closing argument for the plaintiff, severely criticising and denouncing the proposed consolidation, on conclusion of which the case was submitted to the court, Judge Barrett reserving his decision.

The International Electrical Congress.

THE London *Standard's* Paris correspondent states that the German, Dutch, Swiss and Italian Governments have already notified their adhesion, and the participation of England, the United States, Russia and Austria is confidently anticipated.

Fatal Accident to a Linesman.

JOHN FARLEY, a telegraph linesman, fell from a telegraph pole in front of Haverly's Fourteenth street theatre, in this city, January 24th, and died next morning from the injuries received.

Siemens' Electric Lifts.

DR. WERNER SIEMENS has made another useful application of the dynamo-electric current to the performance of mechanical work. Hydraulic lifts are costly to install and to maintain, so he has invented an ingenious electric lift, which has been exhibited recently at the Mannheim Industrial Exhibition, where in the course of a few weeks it conveyed over 8,000 persons at a speed of 1½ ft. per second. The lift is quite safe, the carriage being suspended by two wire ropes which pass over drums at the upper terminus and carry counterweights at their ends which equilibrate the average burden to be borne. To raise or lower the lift, therefore, only slight additional power is required. This is supplied in the form of an electric current from a dynamo-electric generator on the ground and it is conducted to a second dynamo machine attached to the carriage. The propulsion is effected by means of a metal ladder or rack which runs up the middle of the "shaft" or passage of the lift, and into this rack work two toothed wheels carried by the lower part of the framework of the carriage. These wheels are driven by the revolving armatures of the dynamo machine on the car by means of an endless screw. The current is led from the stationary generator to the moving one by conductors running up the sides of the ladder and two metal rollers which make contact

with them, and are connected to the armature of the machine. The return part of the circuit is formed by the metal wires which haul the carriage. In hotels and such places, for the conveyance of persons and luggage, this electric lift is likely to be useful; but for mercantile purposes it would be advisable, perhaps, to modify it, and replace the ladder arrangement by a wire rope and driven by the current.—*Engineering*.

Electric Light Good for the Eyes.

WHEN the electric light first began to be used in our shops, factories, and places of amusement, it was confidently asserted by its opponents that so dazzling a light must be injurious to the eye. The objection seemed plausible at least, although the light when diffused seemed to have the quality of bright moonlight, which is the reverse of irritating. People would persist in looking at the source of the light, and as the early lamps were far from steady, the observer's eyes suffered both from the intensity of the light and the sudden and large variations in the quantity of it. It appears, however, from the experiments recently made by Professor Cohn, of Breslau, whose name is so familiar in connection with the investigation of color blindness and other optical defects, that our eyes will be benefitted rather than hurt by the new method of lighting, and it is obvious that with incandescent electric lighting the advantages will be still more marked.

While testing the influence of electric light on visual perception and the sense of color, Dr. Cohn proved, he thinks, that letters, spots, and colors were perceived at a much greater distance under electric illumination than by gas light, or even daylight. Compared with daylight, the electric light increased the sensation of yellow sixty-fold, red six-fold, and green and blue about twofold. Eyes that in daylight or gaslight could perceive and distinguish colors only with difficulty were much aided by the electric light, and the visual perception was much strengthened. In all cases of distant signaling, Dr. Cohn believes that the electric light will prove exceedingly and especially useful.

A TELEPHONE man, dining out, being called upon by the pious head of the family to say grace, began his invocation: "Hello! Hello!"

AN old lady in a town of Massachusetts refused the gift of a load of wood from a tree struck by lightning, through fear that some of the fluid might remain in the wood and cause disaster to her kitchen stove.

BORN.

FERRER.—At Milan, Mo., Monday, January 10th, 1881, to GEO. H. FERRER, agent and operator B. & S. W. Railway, Milan, a son.

MARRIED.

GRAY—WHEELER.—At the residence of the bride's parents, Newport, Ind., by Rev. J. H. Hollingsworth, D. B. GRAY, agent and operator O. & E. I. Railway, to Miss EMMA WHEELER.

PALMER—WEBB.—At the residence of the bride's parents, Pontiac, Mich., January 12, 1881, STEWART PALMER, operator Western Union Telegraph, Pontiac, and Miss CARRIE WEBB.

STEVENS—BORHEK.—At Bethlehem, Pa., Dec. 30, '80, by Bishop Edw. de Schwenitz, of the Moravian Church, at the residence of the bride, THOMAS J. STEVENS, of the American Union Telegraph, Toledo, Ohio, to Miss ANNIE A. BORHEK.

DIED.

JASSELYN.—At Mansfield, Ohio, January 4, 1881, MARGUERITE L., aged 18 months, only daughter of B. S. Jasselyn, manager A. & P. Telegraph, and ticket clerk U. P. R. R., Grand Island, Nebraska.

STOLBRAND.—At Cincinnati, Ohio, January 20, 1881, of consumption, A. G. STOLBRAND, operator Western Union Telegraph, offices.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, February 1, 1881.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

GENERAL INFORMATION.

DACOTAH.

Hereafter the "tariff for other lines" on half rate messages to the offices on the Black Hills line, beyond Cheyenne, Wyo., will be 75 and 5. The following are the names of the offices on the Black Hills line: S.

Custer City, Dac.	Rochford, Dac.
Central City, "	Camp Robinson (Red Cloud Agency) Neb.
Deadwood, "	
Lead City, "	Hat Creek, Wyo.
Red Canon, "	Cheyenne River, Wyo.

FLORIDA.

315 Molino, reopened.

GEORGIA.

237 Milner, closed. S.

IDAHO.

* Lewiston is now 100 6 from Walla Walla, Wash'n Terr.

S.

INDIAN TERRITORY.

* Wichita Agency, closed. S.

KANSAS.

502 Baileyville, closed. S.

KENTUCKY.

Business for * * St. Mary's College, given under Lebanon in the tariff book, is now mailed from Lebanon. a.

LOUISIANA.

434 Mermentau, closed.

It has been reported that messages for Vermillionville, opened as a W. U. office in JOURNAL of April 1, 1880, have been refused. Vermillionville is still open, but the office at Vermillion was closed in JOURNAL of December 18, 1880.

MEXICO.

On and after (date to be given hereafter in special order by telegraph) all present rules and rates for messages to Mexico, and the list of Mexican offices now in use, will be cancelled and Mexican messages will be accepted, subject to Western Union rules for counting, and at the rates for "This" and "Other" lines given below. All messages must be prepaid. Check Brownsville, Texas, as heretofore.

From any Western Union Office north of Louisiana or Texas, the "Tariff for this line" to Brownsville, on Mexican business will be..... \$1.25 and 10

From any Western Union office in Louisiana or Texas (except Brownsville), the "Tariff for this line" to Brownsville on Mexican business will be..... 75 and 5.

The "Tariff for other lines" beyond Brownsville, Texas, will be as follows:

	For ten words or less.	For each word over ten.		For ten words or less.	For each word over ten.
Acaxochitlan	\$1.50	44	Alvarado	4.50	44
Acambaro	4.00	40	Ameca	5.25	50
Acapulco	4.00	40	Auhelo	4.00	40
Acaponeta	4.00	40	Anganguao	4.00	40
Actopan	4.25	42	Apaseo	4.00	40
Acayucan	5.12	47	Apizaco	4.00	40
Aguaascalientes	4.52	45	Arandas	4.00	40
Ahuatlulco	5.12	49	Arroyozarco	4.00	40
Ahuacatlan	5.50	52	Atotonilco	4.00	40
Altamira	4.00	40	Avino	4.00	40
Alaquines	4.00	40	Bagdad	4.00	40
Allende del Parral	4.00	40	Barra de Tampico	4.00	40
Altata	4.00	40	Camargo	75	7
Alamos	4.00	40	Catorce	4.00	40

	For ten words or less.	For each word over ten.		For ten words or less.	For each word over ten.
Carro	4.00	40	Matamoros	.75	2
Cadereyta Jimenez			Medellin	4.25	42
de Nuevo Leon	75	7	Matehuala	4.00	40
Cadereyta Mendez			Mequitic	4.37	42
de Queretaro	4.00	40	Mexico	4.00	40
Campeche	4.00	40	Mexcala	4.00	40
Camaron	4.00	40	Minatitlan	5.25	47
Canada Morelos	4.00	40	Mier	.75	7
Cerralto	75	7	Monterrey	.75	7
Cerritos	4.00	40	Motteruma	4.00	40
Celaya	4.00	40	Monte Morelos	4.00	40
Cerro Gordo	4.00	40	Morelia	4.00	40
Charcas	4.00	40	Moorito	4.00	40
Chilpancingo	4.00	40	Nazas	4.00	40
Chihuahua	4.00	40	Nieves	4.50	43
Chalchihuites	4.00	40	Nochistlan	4.50	43
Ciudad Victoria	4.00	40	Noria de Angeles	4.25	42
Ciudad del Mals	4.00	40	Nombre de Dios	4.00	40
Copala	4.00	40	Nuevo Laredo	4.00	40
Colotlan	4.37	42	Nuevo Morelos	\$4.00	40
Collima	5.00	56	Oaxaca	4.00	40
Concordia	4.00	40	Ojocaliente	4.00	40
Coosla	4.00	40	Ometusco	4.00	40
Cordoba	4.00	40	Orizaba	4.00	40
Cosamalapaam	4.90	46	Ozuluama	4.00	40
Comitan	4.00	40	Pachuca	5.25	48
Cuitzeo de Abasco	4.00	40	Panuco	4.00	40
Quantitlan	4.00	40	Papantla	6.00	53
Cuernavaca	4.00	40	Paso de San Juan	4.25	45
Culcatlan	4.00	40	Perote	4.75	45
Cunducan	4.00	40	Penjamo	4.00	40
Cuencame	4.00	40	Pichualco	4.00	40
Cullacan	4.00	40	Pinos	4.37	42
Cuautla	4.10	45	Potosi	4.50	43
Dolores Hidalgo	4.00	40	Polotitlan	4.00	40
Dos Caminos	4.00	40	Puebla	4.00	40
Durango	4.00	40	Purandiro	4.00	40
Encarnacion	4.50	44	Puerto de Ixtla	4.00	40
Eliota	4.00	40	Queretaro	4.00	40
Esperanza	4.00	40	Quila	4.00	40
Ezatlán	5.25	50	Quiroga	4.00	40
Fresnillo	4.25	42	Quelite	4.00	40
Guadalcázar	4.00	40	Reynosa	.75	7
Guanajuato	4.00	40	Real del Monte	4.25	42
Guadalupe	4.00	40	Rinconada Bomos	5.00	48
Guerrero	4.00	40	Rio Grande	4.37	42
Hacienda de San Nicolas	4.90	46	Rinconada	4.50	43
Hacienda de Santiago de Pinos	4.00	40	Rio Verde	4.00	40
Hacienda del Carmen	4.00	40	Rio Florida	4.00	40
Hechelchacan	4.00	40	Romita	4.00	40
Hermosillo	4.00	40	Rosales	4.00	40
Hidalgo del Parral	4.00	40	Rosario	4.00	40
Huamantla	4.00	40	Salinas Victoria	4.00	40
Huanchinango	4.50	44	Saltillo	.75	7
Huichapan	4.50	44	San Luis Potosi	4.00	40
Iguales	4.00	40	San Francisco del	4.00	40
Irapuato	4.00	40	Rienon	4.00	40
Ixtlan o Villa	4.00	40	San Francisco o	4.00	40
Juarez	4.00	40	Villa de Reyes	4.60	40
Ixtlahuaca	4.00	40	San Felipe Torres	4.00	40
Ixmiquilpan	4.37	43	Mochas	4.00	40
Ixtlan	5.37	51	San Miguel de Al-	4.00	40
Jalacingo	5.50	50	lende	4.00	40
Jalapa de Vera Cruz	4.50	43	San Jose Iturbide	4.00	40
Jalpa de Guanajuato	4.00	40	San Luis de la Paz	4.00	40
Jaumave	4.00	40	San Diego de la	4.00	40
Jalos	4.50	44	Union	4.00	40
Jerez	4.25	42	Santa Maria del Rio	4.00	40
Jilotepec	4.00	40	Salinas del Penon	4.00	40
Jojutla	4.10	45	Blanco	4.00	40
Juchipila	4.50	43	San Pedro Piedra	4.00	40
Lampazos	4.00	40	Gorda	4.00	40
La Ventura	4.00	40	Salamanca	4.00	40
La Barca	4.00	40	Salvatierra	4.00	40
La Piedad	4.00	40	San Felipe del	4.00	40
Lagos	4.25	42	Obraje	4.00	40
Linares	4.00	40	San Juan del Rio	4.00	40
Marin	4.00	40	San Carlos Yautepo	4.00	40
Maravatio	4.00	40	San Juan Bautista	4.00	40
Mazatlan	4.50	40	San Cristobal Las	4.00	40
Mansanillo	6.00	56	Casas	4.00	40
			San Rosalia	4.00	40
			San Pedro del	4.00	40
			Gallo	4.00	40
			Salto	4.00	40
			San Ignacio	4.00	40

	For ten words or less.	For each word over ten.		For ten words or less.	For each word over ten.
Santiago Ixcuintla	4.00	40	mio	4.00	40
San Juan Teotihuacan	4.00	40	Tequila	5.00	48
San Marcos	4.50	43	Tlalpujahua	4.00	40
San Andres Chalchicomula	5.00	46	Tlalnepantla	4.00	40
San Martin Texmelucan	5.00	46	Tlalpam	4.00	40
Santa Ana Acatlan	5.00	46	Tlaxcala	4.00	40
San Juan de los Lagos	4.37	43	Tlaxiango	4.37	42
San Gabriel	5.25	50	Tlaxiango	4.10	43
San Blas	6.00	56	Tlaxiango	5.62	51
Sayula	5.25	50	Tlaxiango	4.62	45
Sain Alto	4.25	42	Tlaxiango	4.00	40
Silao	4.00	40	Tlaxiango	4.00	40
Sinaloa	4.00	40	Tlaxiango	4.00	40
Sombrerete	4.37	42	Tlaxiango	4.00	40
Foyniquilpan	4.00	40	Tlaxiango	4.00	40
Tampico	2.50	25	Tlaxiango	4.37	43
Tantoyuquita	4.00	40	Tlaxiango	4.00	40
Tasco	4.00	40	Tlaxiango	4.00	40
Tacotalpa	4.00	40	Tlaxiango	4.00	40
Tancanhuitz	4.00	40	Tlaxiango	3.50	35
Tamasunchale	4.00	40	Tlaxiango	4.00	40
Tetecala	4.10	45	Tlaxiango	4.00	40
Tepetitlan	4.62	45	Tlaxiango	4.00	40
Tenli	4.50	44	Tlaxiango	4.25	42
Tenancingo	4.00	40	Tlaxiango	4.10	45
Tenango	4.00	40	Tlaxiango	4.10	45
Tepeji del Rio	4.00	40	Tlaxiango	4.00	40
Tehuantepec	4.00	40	Tlaxiango	4.00	40
Tequisitlan	4.00	40	Tlaxiango	4.75	46
Tehuacan	4.00	40	Tlaxiango	5.12	49
Teapa	4.00	40	Tlaxiango	5.37	51
Tepele	4.00	40	Tlaxiango	4.03	40
Texitlan	5.25	48	Tlaxiango	4.00	40
Teotitlan del Ca-			Tlaxiango	4.50	44

MICHIGAN.

* Livonia, closed.

138 St. Helena, reopened.

MISSOURI.

The P. O. A. of 455 Roseberry is, care Burlington Junction. S.

NEBRASKA.

* Kearney Junction is now a W. Union office. Square 522, it will hereafter be known as 522 Kearney.

The following changes in "Tariff for other lines" will take effect at once:

* Buda,	40 3	Grand Island. S.
* Chapman,	40 3	do
* Clarke,	40 3	do
* Elm Creek,	40 3	do
* Gibbon,	40 3	do
* Jackson,	40 3	do
* Overton,	50 3	do S.
* Wood River,	40 3	do

NEW YORK.

36 East Hoesick, closed. S.

OREGON.

Cello, Dalles and Umatilla are now W. Union offices, check San Francisco, Cal.

PENN-SYLVANIA.

Messages for * Ligonier, W. Co., are now forwarded by telegraph, instead of by telephone, from Latrobe. S.

58 Thompson's, given on page 240 of the Tariff Book, is in Susquehanna Co. a.

93 Thompson's, new office in last JOURNAL, is in Tioga Co. S.

TEXAS.

494 Taylorsville changed to 494 Taylora. S.

UTAH.

* Alta City, closed.

VERMONT.

* South Londonderry is now a W. Union office, square 31. S.

WASHINGTON TERRITORY.

Cascades, Walla Walla, and Wallula are now W. Union offices, check San Francisco, Cal.

Hereafter the "Tariff for other lines" to Dayton and Waltsburg will be 75 and 5 from Walla Walla and to Almoda, Colfax, F. rt Coeur D'Alene, Pomeroy and Spokane Falls, 100 and 6 from Walla Walla. Government messages to Dayton and the other places named above will be charged at the rate of 75 and 5 for other lines beyond Walla Walla. S.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

ALABAMA.

267 Chehaw

COLORADO.

623 Cotopaxi.
599 Robinson.

CONNECTICUT.

* Poquonnock 15 cents by stage, or \$1.00 special delivery from Windsor.

* Rainbow 15 cents by stage, or \$1.25 special delivery from Windsor.

FLORIDA.

* Hart's Road, Nassau Co., 50 4 Lake City.

IDAHO.

* Fort Lapwai 100 6 Walla Walla, Washington Territory.

ILLINOIS.

319 Browns.
358 Franklin.
329 Metropolis City.
336 Panola.
358 Waverly.

INDIANA.

298 Ainsworth.
300 Gentryville.
252 Parker.

IOWA.

417 Camden.
* Newburg (H. R.), 25 2 Marshalltown.

KENTUCKY.

* St Charles 50 3 Elizabethtown.

MISSOURI.

* State Lunatic Asylum No. 2 (near St. Joseph) 75 cents, by telephone, from St. Joseph.
455 Westboro.

NEBRASKA.

* Alda (H. R.) 40 3 Grand Island.
* Shelton (H. R.) 40 3 Grand Island.

NEW JERSEY.

* Centerville, Camden Co., 10 cents delivery from Camden.
* East Camden 10 cents do do
* Kaighn's Point 10 cents do do
* Stockton 10 cents do do
* Wrightsville 10 cents do do

NEW MEXICO.

562 Chamita.

NEW YORK.

57 Saugquoit.

OHIO.

221 Berwick.
212 Locust.
221 Mill Grove.
20. Sycamore.

OREGON.

Bialocks.
Deschutes.
Hood River.
Locks.
Rooster Rock.
Willows.

PENNSYLVANIA.

59 St. Peters, Chester Co.
76 Swatara Dauphin Co. Check Hummelstown.

VERMONT.

36 Jamaica.
36 Newfane.
* Sunderland, 15 1 Manchester.
36 Townshend.
36 West Dummerston.
36 West Townshend.

VIRGINIA.

* Chincoteague Island, mail from Franklin, Accomac Co., and collect 3 cents for postage.
* Herndon, 25 2 Alexandria.

WASHINGTON TERRITORY.

Ainsworth.
Whitman.

ATLANTIC CABLE.

The cable between Bahia and Rio de Janeiro, South America, has been repaired.

NORVIN GREEN,

President.

Transfer Service.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, January 26, 1881.

To all Transfer Agents and Offices:

The transfer service has been discontinued at Victoria, V. I., in Frank Jaynes' district.

On and after Feb. 14th, 1881, the transfer service will be discontinued at Indianola, Texas, in G. M. Baker's district.

Managers will correct their lists accordingly.

NORVIN GREEN,

President.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

P. O. BOX 3175.

NEW YORK.

New York, February 1st, 1881.

ASSESSMENT No. 138.

A. T. LANGHORNE.—W. H. FANNING.

A. T. LANGHORNE died of Pulmonary Consumption, at Indianapolis, Ind., Dec. 19th 1880. His certificate, No. 499, was issued March 26th, 1880.

One dollar is due to meet this assessment from members holding certificates up to and including No. 3914.

W. H. FANNING was accidentally killed in the yard of the Missouri Pacific R. R., at Oranget, Mo., December 7th, 1880. His certificate, No. 542, was issued May 10th, 1880.

The claim in this case will be paid from surplus.

Insurance expires March 3d, 1881, membership April 2d, 1881.
J. N. ASHLEY, Secretary.

Patented Inventions.

Titles of Patents issued January 11, 1881.

236,460.—AUTOMATIC REGULATOR FOR ELECTRIC CURRENTS. William E. Sawyer and William Sawyer, New York, N. Y., assignors to Eastern Electric Manufacturing Co., Middletown, Conn. Filed Oct. 2, 1880. (No model.)

236,478.—ELECTRICAL CARBONIZING APPARATUS. Clinton N. Ball, Troy, and John H. Guest, Brooklyn, N. Y. Filed Oct. 15, 1880. (No model.)

236,493.—ELECTRICAL RAILROAD SIGNAL. Henry B. Hayes, Woburn, and Joshua Gray, Medford, Mass. Filed November 17, 1880. (No model.)

236,569.—EQUALIZING DYNAMO-ELECTRIC CURRENTS BY MEANS OF SECONDARY BATTERIES. Stephen D. Field, San Francisco, Cal. Filed Aug. 4, 1879.

236,629.—ELECTRO-MAGNETIC STATION INDICATOR. Palmer C. Ricketts, Troy, N. Y. Filed March 2, 1880.

Titles of Patents issued Jan. 18, 1881.

236,800.—APPARATUS FOR TELEPHONE-LINES. Ezra T. Gilliland, Cincinnati, Ohio, assignor to American Bell Telephone Company, Boston, Mass. Filed Dec. 2, 1878.

236,833.—ELECTRIC LAMP. Joseph V. Nichols, Brooklyn, assignor to the United States Electric Lighting Company, New York, N. Y. Filed Oct. 18, 1880. (Model.)

Titles of Patents issued Jan. 25, 1881.

236,884.—SWITCH BOARD FOR ELECTRIC CIRCUITS. Ellis F. Frost, Pawtucket, R. I., assignor of one-half to Charles H. M. Blake, Weston, Mass. Filed Sept. 13, 1880. (Model.)

236,986.—ELECTROPLATED INSULATED CONDUCTOR OF ELECTRICITY. Thomas Cochran and James Cochran, Brooklyn, N. Y. Filed Oct. 13, 1880. (No model.)

237,046.—TELEPHONO RECEIVING APPARATUS. Charles A. Randall, New York, N. Y. Filed Nov. 3, 1880. (No model.)

237,071.—ELECTRO-MAGNETIC BRAKE. Hugo Walter, Augustus L. Duwellus, and Frank R. Mettall, Cincinnati, Ohio. Filed Nov. 9, 1880. (No model.)

RECENT ENGLISH PATENTS.

4,850.—IMPROVEMENTS ON SWITCHES AND APPARATUS FOR USE UPON TELEPHONE LINES. S. Pitt. (Communicated by C. D. Haskins.) Nov. 23, 1880. Complete.

4,862.—TELEPHONES. S. Pitt. (Communicated by C. de Nottbech.) Nov. 23, 1880.

4,866.—ELECTRIC LIGHTING APPARATUS. (ELECTRO-MAGNET.) W. R. Lake. (Communicated by H. S. Maxim.) Nov. 23, 1880. Complete.

4,782.—AN IMPROVED METHOD AND APPARATUS FOR AUTOMATICALLY COUNTING THE NUMBER OF LETTERS IMPRESSED WITH OBLITERATING AND OTHER STAMPS. H. Ferguson and H. R. Kempe. Nov. 19, 1880.

4,851.—CURRENT METER. H. Law. Nov. 23, 1880.

5,068.—IMPROVEMENTS RELATING TO TELEPHONO AND OTHER SYSTEMS OF ELECTRICAL COMMUNICATION. J. N. Culbertson and J. W. Brown, December 6, 1880.

5,083.—IMPROVEMENTS IN THE MANUFACTURE OF CABLES FOR

TELEGRAPHIC AND TELEPHONIC PURPOSES, AND IN APPARATUS EMPLOYED THEREIN. E. Berthoud and F. Borel, December 6, 1880.

5,091.—IMPROVEMENTS IN THE MEANS FOR COMMUNICATING INTELLIGENCE BY ELECTRICITY, AND IN TELEGRAPHY BY INDUCED CURRENTS. H. J. Haddan. (Communicated by S. L. M. Barlow.) (Complete.) December 7, 1880.

5,092.—MAGNETO-ELECTRIC SPEAKING TELEPHONE. H. J. Haddan. (Communicated by S. L. M. Barlow.) December 7, 1880. (Complete.)

5,113.—TELEPHONES. J. B. Morgan. (Communicated by T. A. Edison.) Dec. 8, 1880.

5,137.—IMPROVEMENTS IN DYNAMO-ELECTRIC, MAGNETO-ELECTRIC, AND ELECTRIC MAGNETIC MACHINERY AND APPARATUS FOR THE PRODUCTION OF LIGHT AND HEAT, THE TRANSMISSION OF POWER, AND FOR OTHER USEFUL PURPOSES, AND IN ELECTRIC LAMPS. W. T. Henley. Dec. 9, 1880.

5,141.—MAGNETIC APPARATUS, OR MACHINERY FOR SEPARATING IRON ARTICLES OR PARTICLES FROM WHEAT OR OTHER GRAINS, EITHER WHOLE OR IN THEIR VARIOUS STAGES OF REDUCTION, FLOUR, AND OTHER LIKE SUBSTANCES. T. M. Clark. Dec. 9, 1880.

5,152.—ELECTRIC DRILLS. S. Pitt. (Communicated by C. E. Bull.) Dec. 9, 1880. (Complete.)

5,162.—TRANSMITTING AND RECEIVING APPARATUS OF PRINTING TELEGRAPHS. H. Van Hoevenburg. Dec. 10, 1880.

5,226.—IMPROVEMENTS IN THE ART OF TRANSMITTING TELEPHONO MESSAGES, AND IN CONTROLLING THE GROUND WIRES OF THE CIRCUIT'S STATION INSTRUMENTS FROM THE MAIN OR CENTRAL STATION, THE APPARATUS AND OTHER MECHANISMS AND APPLIANCES THEREFOR, AND THEIR COMBINATION. A. M. Frankenberg. Dec. 14, 1880.

5,237.—IMPROVEMENTS IN MACHINERY FOR BRAIDING, LAPPING, OR OTHERWISE COVERING TELEGRAPH WIRES, CHIMOLINE STEEL, ENGINE PACKING, OR OTHER CORES, WITH TEXTILE OR OTHER MATERIAL FOR INSULATING, PROTECTIVE AND OTHER PURPOSES. W. T. Glover and G. F. James. Dec. 14, 1880.

5,268.—IMPROVEMENTS IN THE MODE OF AND APPARATUS FOR TRANSMITTING DRAWING, CHARACTERS AND WRITINGS BY ELECTRICITY; PARTS OF WHICH IMPROVEMENTS ARE APPLICABLE TO ORDINARY TELEGRAPHY. A. W. Reddie. (Communicated by J. Andre.) Dec. 15, 1880.

5,275.—IMPROVEMENTS IN AND RELATING TO MEANS AND APPARATUS FOR ELECTRIC LIGHTING, PARTS OF WHICH IMPROVEMENTS BEING APPLICABLE ALSO TO OTHER PURPOSES. D. G. Fitzgerald. Dec. 15, 1880.

5,319.—AN IMPROVED ALPHABET OR CODE SYSTEM AND MEANS OR APPARATUS FOR COMMUNICATING INTELLIGENCE BY VISIBLE, AUDIBLE OR OTHER SIGNALS. A. M. Clarke. (Communicated by C. G. Burke.) Dec. 15, 1880.

5,340.—TELEPHONE SIGNAL APPARATUS. W. Morgan-Brown. (Communicated by G. H. Bliss.) Dec. 20, 1880.

5,352.—DYNAMO-ELECTRIC TELEGRAPHY. S. Pitt. (Communicated by O. Lugo.) Dec. 20, 1880.

5,387.—MICRO-TRANSMITTERS. W. Johnson. Dec. 22, 1880.

5,414.—IMPROVED ALARM SIGNAL FOR DOORS, WINDOWS OR THE LIKE CLOSURES. A. C. Farrington. Dec. 23, 1880.

5,482.—IMPROVEMENTS IN AND CONNECTED WITH TELEPHONO APPARATUS. C. J. W. Wollaston. Dec. 30, 1880.

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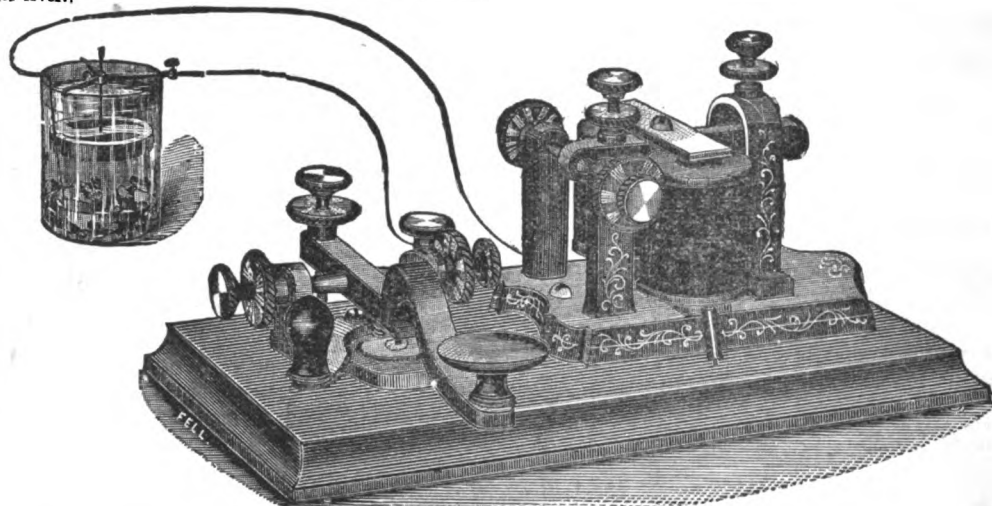
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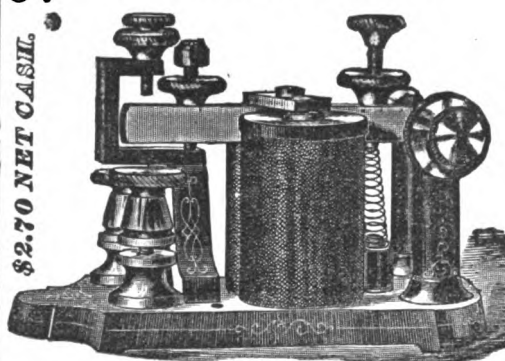
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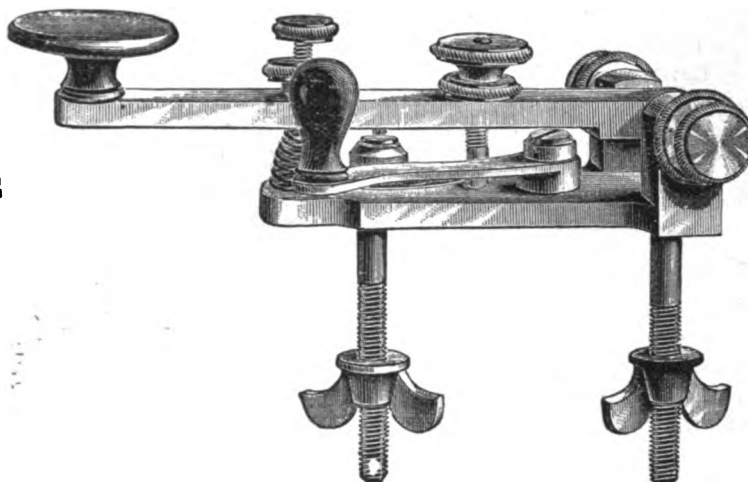
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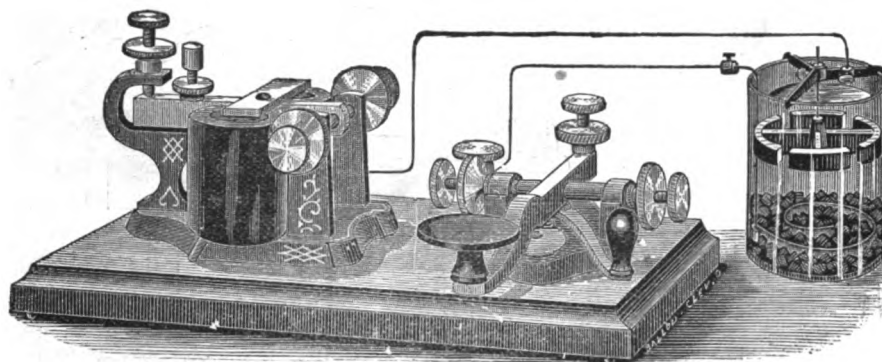
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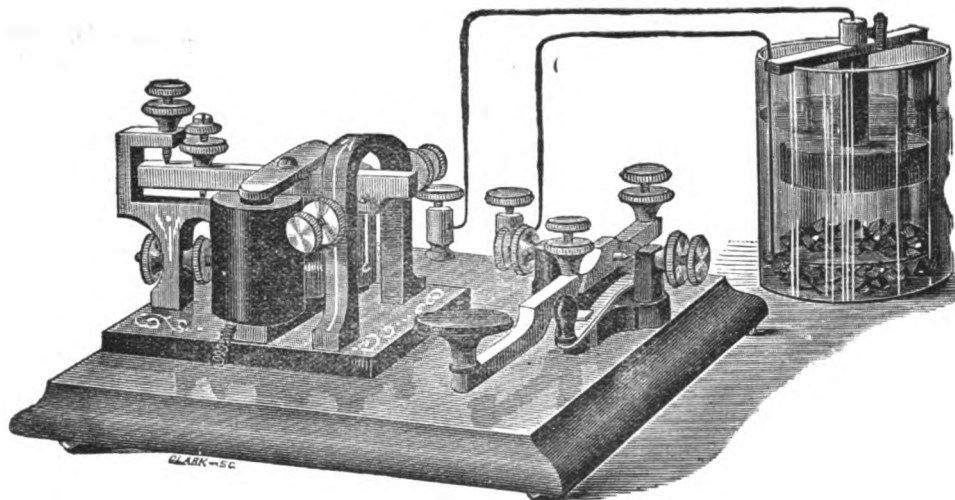
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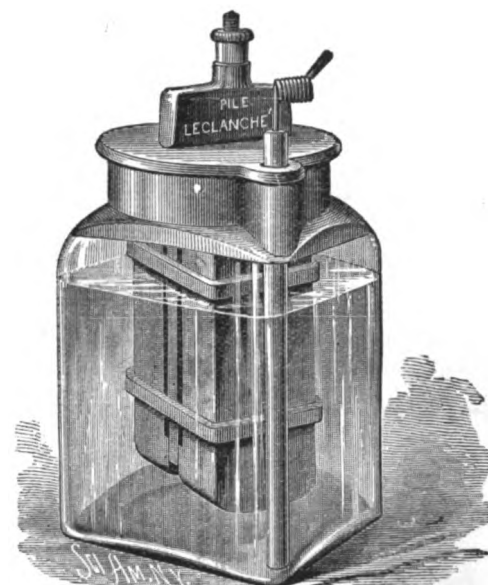
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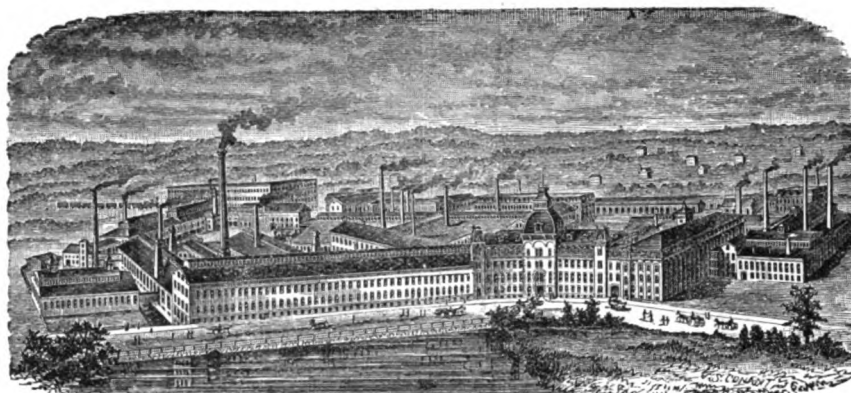
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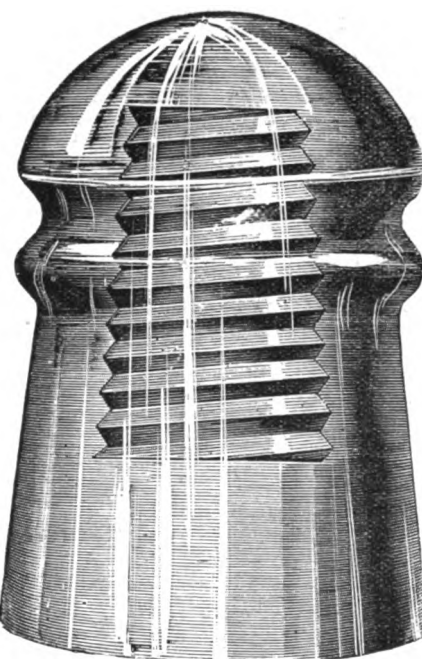
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payable from the net earnings for the quarter ending Novem-
ber 30, 1880, at the office of the treasurer, on and after the 30th
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JOURNAL OF THE TELEGRAPH.

VOL. XIV.

NEW YORK, FEBRUARY 16, 1881.

WHOLE NO. 319.

PROPOSED TELEGRAPHIC LEGISLATION.

Argument of President Norvin Green at Albany against the Proposed Anti-Consolidation Act.

At a hearing before the Senate Committee on Miscellaneous Corporations at Albany, on Tuesday, February 8th, Dr. Norvin Green addressed the Committee in opposition to the proposed legislation. The following abstract of his remarks on the subject will be found interesting and instructive:

We are here, said Dr. Green, to try to persuade the Committee that this legislation ought not to be had, but not because of any effect it will have on the particular transaction at which it is probably aimed. We believe, and are so legally advised, that at no time since the introduction of this bill would its passage have affected in the least the completeness of the contract or purchase which had been made and ratified by the requisite majority of directors and stockholders of the companies according to the law as it stands. If you leave the stock speculation out of consideration in this matter there is absolutely nothing left to complain of. The sum and substance of that stock speculation is simply this: An opposition telegraph line to the company I represent was projected. The stock of our Company was thereby run down to a great deal less than its intrinsic value, as all sorts of threats were made and a war of rates was being constantly made. We cut down our expenses and trimmed sails for a long fight. The larger stockholders of our Company unloaded what they could on speculation and kept only what they could afford to keep during the fight. We expected another year's warfare, when, to our surprise, it was ascertained that the other party had accumulated a large part of our stock, and then announced to us that they were ready for an adjustment. If we had considered it in a speculative sense, we had only to say we were not ready, and thereby compelled a receding of the market value of the stock. We were prepared for another year's fight, but there were 2,000 stockholders in the country who were not speculators whose property would have been run down in its market value, and they would have been induced or compelled to sell it at a sacrifice. We could not afford to forego an opportunity so unexpectedly offered, and we accepted the negotiation. That was the whole of it. It so happened that a number of speculators were following closely on the trail of the great leader, helping him to sell the stock down by selling shares they did not own. Everything was going lovely, and they were quite persuaded the stock was good for ten or twenty points more decline when the wily leader doubled on his tracks, and the whole pack ran by, so intent upon the chase that they did not see him as he passed back, picking up the chickens they were dropping, and before they had found the trail in the direction they felt sure he was running, he was cosily ensconced in his den enjoying his chicken supper, sauced with 100,000 shares. Then, of course, there

was a great howl, and they put forward Mr. Hatch to procure injunctions, and the Court told them that everything done was strictly legal. They came before the Attorney-General, and he told them he had no authority to act in the matter; that what had been done was strictly in accordance with law. These complainants remind me a good deal of a friend of Senator Bright of Indiana. During the Mormon war troops were sent out to protect and assist the Governor. Of course contracts for supplies were to be furnished. A large flour contract was to be awarded. The gentleman from Indiana went to see his Senator about getting the contract. He was a little late, and some other applicants who were already there met him and told him: "Don't you put in a bid yet. We are going to have a meeting and arrange this thing so as to get a good price for the flour." They put him off and put off their meeting, until one morning the papers announced that the contract had been let. The Senator met his friend and said: "I see that contract has been let; is that all right?" "It is if I am in, but I am not in. It's a d—d swindle!" And now, that is about the way the people who are sore under this stock speculation have felt about it. In the injunction case I believe it was in proof that after the order of injunction was obtained, the gentleman who obtained it carried it in his pocket all day, trying to get a bid to see what they would give him if he would let the matter drop, but failing in that, he served it about five o'clock in the afternoon. Take that scheme out of the case, what is left? Is there anybody complaining about the telegraph service? Not a single newspaper or a single voice has said that we are not rendering a good service at fair and reasonable rates.

I state here, as an old and practical telegrapher, that there is not such a telegraph service in the world as we are rendering in the United States to-day; and there is not anywhere in the world so cheap a service, except in the Dominion of Canada. We send a message 3,000 miles for \$2.00, and there is not another service in the world where messages are sent that distance at those rates. The uniform shilling rate of Germany and France cover only small areas, and when you come to send a message 3,000 miles under their service, computing all charges, you find the rate to be about \$1.00. We send a message from Portland to San Francisco for \$2.00, and in less than half the time a message can be sent that distance anywhere else in the world. The wise legislation and laws of this State have enabled the Company to consolidate companies reaching all over the country, so that business can be handled without repetition or delay. There is no relaying, no recounting and entering, or transferring from one company to another, but it is all upon the continuous line which has been studied to bring it in harmony, so that there shall be no friction and no delay; and I assert that the telegraph service in the United States has been brought to its present usefulness and perfection, and the present low rates

have been made possible by means of consolidation. When I went into the business in 1854 a message sent from New York to New Orleans had to go over the lines of four different companies, and no one expected an answer the same day. They called our line the "Owl Line," because we had to work all night to get the business down there, and work all day to get what accumulated there up. If they got their message the next day after it was sent they thought they were doing remarkably well. Now, if a cotton firm send a message to New Orleans from New York and do not get an answer within an hour they raise a row about it. Our Company has spent over \$2,000,000 within eighteen months to meet the increased exactions made by the public upon the Company to render a better service. A service that would satisfy our customers two years ago, they would raise a row about now. I have known messages to be sent over our wires from the Produce Exchange in New York to Chicago and the answer would come before the sender had left the counter, and if they do not get an answer within half an hour at the most, they raise a row, and it is because of the increased facilities obtained through the means of these consolidations that a service of this perfect character has been attained.

There are two points of general complaint outside, I may say, of the antagonism and indignation raised by stock speculation. One is what is pleased to be termed the inflated capital and the other an apprehended increase of rates. Now, on the subject of capitalization, the companies came together in 1866, at which time some fifteen or sixteen companies were consolidated into one. The capital was \$41,073,410. With that capitalization I presume we can have nothing to do at this date, whether too much or too little. Its discussion is barred by limitation, and I presume this Committee does not care to go into it. It was made up from time to time. It was considered at the time a large capitalization, but when we look back and see the immense value of the patents—for even the Morse patents had not at that time expired—it was not a large capitalization. But it struggled on, some of the companies having sunk all the money they put in, many that never paid running expenses. In short, this capital represented money that had been sunk, but which nevertheless must be represented; and when we see the immense growth of the business in the future, and the valuable patents then held, as at present, I think any one who will examine the subject will realize it was not a large capitalization. But in the line of property what did it represent? Thirty-seven thousand three hundred and eighty miles of line, and 75,000 miles of wire, and 2,250 offices. We had on the 1st of July last 85,645 miles of line and 233,534 miles of wire, and 9,077 offices. We have to-day more than 300,000 miles of wire in the united companies, and more than 10,000 offices. Therefore if that \$41,000,000 was in any wise a reasonable capital, then, with fourfold the amount of line and more

than fourfold the amount of business, the double of the capital is not a large capitalization. But we are not going on suppositions.

When these companies were offered to be sold to us, as they had a right to offer them, and we had a right to buy them, of course it was a matter of bargain as to what we could get them for. The American Union had a capital of \$10,000,000 and \$5,000,000 of bonds. They would not sell their property for less, and the question was whether we could afford to refuse to give it and allow our stockholders to go without dividends until they were squeezed into giving up their stock. It would have been in the interest of the speculating portions of interested parties to have declined the offer, but considering that other and larger class of stockholders who held their stock as an investment and not as a speculation, we did not deem it wise to decline. Since the consolidation of 1866 we had acquired a surplus, which we had paid in, of \$16,969,000, or within a few dollars of \$17,000,000. We did not capitalize the whole of that, but to pay the price we agreed to pay we increased our capital \$15,000,000 and something over, representing that much of surplus, and gave it to our stockholders before we went into the new partnership. Was there anything unreasonable about that? Now the articles of association to which our attention has been called in this bill, and which I confess I had never looked at so narrowly before, and which was filed with and made a part of the certificate of incorporation of the Mississippi Telegraph Company, afterward changed to the Western Union Telegraph Company. In those articles unlimited right to increase the capital stock is given, and for new companies and increased lines, and they shall be provided for by issuing an increase of capital stock and in no other way. That was the stipulation in order to protect the stockholders. It was provided that new property should be acquired by new capitalization. I think the Committee will agree with me that that effectually disposes of any reasonable cause for outcry against the capitalization.

But, it is said, it is a great monopoly, which will oppress the people and increase the rates. Why should this be so? In the first place, as the patrons of the telegraph business have three companies and three organizations to maintain, each will have to live and have to make something on its capital. Then will not people unnecessarily have to pay higher rates to maintain three separate organizations than they will to maintain one, when in most cases the work can be done by one office as well as by three? I assert, therefore, the Company can afford to and will, in time, make the rates lower with one organization than they could afford to be made with three organizations in existence. Each company will have to make enough to pay expenses, which are very large, or else there is nothing to divide. Now I have this to say, that no single competitor of the Western Union in fourteen years—and there have been four or five—not a single one has ever paid running expenses for a single month. I do not speak positively as to the American Union, for I have had no opportunity to examine their books; but going back some, even to the old United States Company, which we took up in 1866, there has not been a single competitor that for a single month during its existence earned its expenses. Now, what is to become of competition of that sort? If you preclude their being sold to the only companies that can use them, they must, in time, do great damage to everyone interested in them. I assert, therefore, that the rates can and will be more reduced in the long run under one organization than they will under a number of them.

We have had oppositions from time to time covering a large territory, quite as large as the last opposition, for this late opposition, with all its energy, vim and parade, only reached about thirty-four per cent. of our business. They only reached about 540 offices out of about 9,000. Although many of those were among the largest, they were, in fact, only about six per cent. of the whole, or, as I said, about 540 out of 9,000 offices, and many of these offices being the cream of the business, they did about thirty-four per cent. of the whole business. Now the effect was to make very low rates between certain prominent places, as New York and Chicago. The rate was reduced to 25 cents where it is now 50 cents, but on a great many lines, where the competing lines did not reach, the rates had not been correspondingly reduced, and while we decreased the rate to Chicago and St. Louis below what would be a paying rate, there was no decrease to outside points and the rural districts, hence the effect of this rivalry was to benefit the people of Chicago, New Orleans, St. Louis and other distant points at the expense of the rural districts of the State to which the rival lines did not extend, for whatever was lost by competition between these points had to be made up and borne by the rural districts. Now, nearly all our stockholders are residents of New York State and three-fourths of them in number reside in the country towns. They have put their spare money in the Company as an investment, and it is for them I speak more particularly.

I have said another reason why this bill should not become a law is that it is bad legislation. You cannot prevent a man from selling his property. The right of alienating property is one of its greatest elements of value. Prevent him or a company from selling to the only parties that can need it or use it, and you only depreciate its value, for it proves a loss to him. Sell it he must and will to some one, and what is the effect? It is to afford large capitalists like Vanderbilt and Gould opportunity to buy the property at their own price. You take two large competing systems. By running in opposition to each other and by a war of rates they are a burden instead of a profit to those interested. Now if you prevent the one selling out to the other you only permit these large capitalists to come in and buy up the stocks of both at their own figure and then run them in their own way. They may not unite them or consolidate them, but they do amalgamate them, and the competition sought to be sustained by legislation is avoided. I think it not unlikely that this bill would be favorable to our Company, for I do not think there would be half as many opposition lines projected. If they did not have in mind, if they could not make money they could make the Western Union buy them up, and if you could take from them that privilege I think it would rather protect us. But the system is bad. You have a line of steamers on the Hudson River running from New York to Rondout. Some one puts an opposition line on the route. The Legislature says neither party shall buy out the other. The opposition compels both lines to run at a loss until one of them wants to get out. The only party that can use their boats is their competitor, and the law does not allow that; the only alternative left is to run the boats off at a sacrifice or for some large capitalists to take advantage of their condition, buy up both lines and make their own terms. It would have the same effect upon telegraph companies, for I assure you not one of these opposition companies ever did make a profit, and while I have seen it asserted otherwise as to the American Union, the records of which I have not examined, I have no doubt it will turn out like the rest.

You will excuse me, Mr. Chairman, and gentlemen of the Committee, for going to another feature of this matter not before this Committee. There is a bill before the Senate to compel the Company to put its wires under ground. I think that within a year this will be accomplished so far as practicable, and I desire to say we are now making every possible haste and arrangement to get the wires in New York City and other large cities under ground, but a law that would compel us to put our wires all under ground within twelve months would be certainly a very unreasonable law, and we could not do it, certainly not in a way that would be for the interest or welfare of the public. Only 300 miles of the 1,200 miles of wire in the city of New York are on trunk lines; three-fourths are cross lines affording accommodation to private offices, which would necessarily be cut off if we had to put these wires under ground. When fifteen or twenty wires are running out of the city we could put them under ground without a material increase of expense, although the polling would be sacrificed; but to put a single wire under ground, at the cost of \$1,000 a mile would necessarily deny facilities to all smaller hotels, private counting-rooms and branch offices, of which we have 113 in the city of New York. I venture to say it would necessarily involve the cutting off of three-quarters of those branch offices, and deny the public an accommodation which they have grown to feel they can hardly do without. It would be tenfold worse with the telephone and the American District system. That useful system would be almost entirely destroyed. You can put trunk lines under ground, and I think they will be put there just as soon as it can be done, with the permission of the city to do it, but to compel all wires to be put under ground is to cut off three-fourths of the benefits of the telegraph and a great deal more of the telephone and American District systems. I would suggest that the Senate get information and go slow before sanctioning such a sweeping measure. I do not know that it would materially damage us. We should put our trunk lines under ground and abandon the rest. But it would be a great detriment to the public accommodation.

There are several jobs in the field that have for their purpose the securing of all the available rights of way for an underground system. These are mere speculating jobs, that have for their purpose the security of something which they think may be valuable to some one else. I will not detain the Committee any longer. There are other parties representing the various companies here who are ready to give you the legal status of the matter, and thanking you, gentlemen, for the courtesy you have extended to me, I give way to them.

The hearing was continued on Wednesday, when ex-Judge John K. Porter, and Messrs. Chauncey M. Depew, and Everett P. Wheeler stated forcibly the objections to the passage of such a bill.

TELEGRAPHIC LITIGATION.

Injunction against Consolidation Refused—Rufus Hatch against the Western Union and Atlantic and Pacific Telegraph Companies and others.

In this case, the hearing of which in Supreme Court, Special Term, was reported in our last issue, Judge Barrett handed down his decision, February 3d, in which he elaborately considers the points and arguments submitted, and denies the continuance of the temporary injunction, obtained *ex parte*, restraining the defendants from completing the proposed consolidation of the Western Union, Atlantic and Pacific, and American Union Telegraph Com-

panies asked for. The opinion is a very able one, and in view of the importance of the interests involved, was very carefully prepared.

In the first place, in reference to the plaintiff's averment that the American Union Company was created with a view to the establishment and maintenance of an independent competing telegraph company, the lowering of rates, and the consequent furthering of public interests, and that this understanding is to be nullified by the proposed action, the judge holds that one difficulty with this position, and the only one which needs to be dwelt upon, is the entire absence of any binding compact upon the subject. Whatever may have been the purposes and objects of the promoters and corporators, or with whatever understanding and intent the original subscribers to the stock may have come forward, not a word expressive of such purpose, understanding or intent, in any wise limiting the power of the corporation, its directors and stockholders, under the law, was embodied in the certificate of incorporation. Nor was there any contract of restriction between such corporation and its promoters, corporators or shareholders, nor between all or any of the latter classes.

The real question, the judge apprehends, is whether the agreement in question (of consolidation) is within the statute of 1870, authorizing telegraph companies to consolidate, purchase property, etc. The judge argues this question at considerable length, and fully agrees with the view taken of this act by Mr. Justice Van Brunt in the case of *Benedict vs. the Western Union Telegraph Co.* and others. The following observations of that learned and able judge, he says, are pertinent: "What arrangements two telegraph companies could make in reference to the conduct of their business which would not be protected and come within the scope or meaning of the foregoing act, I am totally at a loss to imagine. They may consolidate; they may construct, maintain and use lines of telegraph not mentioned in the original certificate of incorporation; they may jointly construct, lease, own and use such lines; they may lease, sell or buy telegraph property, rights, privileges and franchises, or any interest therein, or any part thereof, paying and receiving in payment therefor stock, money or property. It would seem to have been the intention of the Legislature to give to telegraph companies the power to make any and all arrangements for the conduct of their business, either jointly or separately, which natural persons could possibly enter into, requiring in some instances to such arrangements the consent of three-fifths or two-thirds, as the case may be, of the directors and stockholders of the corporation."

In regard to the question of practical monopoly of telegraphy, which it is urged that the consummation of the agreement for consolidation will give to the corporation purchasing, vehemently denounced as contrary to public policy, the judge says that such considerations are more properly to be addressed to the legislative body. "Our duty," he says, "begins with the ascertainment of what the law is. It ends with its application and enforcement." Not a doubt has been intimated as to the constitutionality of the Act of 1870. Clearly, then, it must control. But this act is not the only indication of legislative intent. A like general policy runs through the telegraphic legislation of this State. Considerations of policy, in the sum of general public feeling, cannot avail in the courts against express legislative authority constitutionally granted.

In regard to the personal charges made, he says: "Nor did we dwell at any length upon the charges and countercharges of a purely personal character. The individual defendants were certainly not dis-

qualified as directors from entering into this initial agreement, merely because as stockholders they profited by it. That is a strange grievance to be put forward by a stockholder who has himself profited by the appreciation of his stock consequent upon the very acts of which he complains. If this appreciation is fictitious or ephemeral, if the agreement is really contrary to the best interests of these stockholders, they have the matter in their own hands. Their adverse vote will end the whole matter. We are told that the requisite three-fifths of the stock is already in the hands of the individual defendants or their associates in the scheme. If that be so, it is their right to exercise the power which the possession of such interests confers upon them. The Court cannot interfere with them so long as they keep within the law; and that, as we have seen, they have thus far succeeded in doing.

"The proofs with regard to the plaintiff's use of the temporary injunction have not so far been noticed, for the reason that we thought it better to pass upon the merits at once. We feel bound to say, however, that if the general result had been otherwise, we should still have felt constrained to deny the present injunction, because of the course which the plaintiff pursued with regard to it. A party coming into the court and seeking equitable relief must apply in perfect good faith. The Court will not permit its process to be procured and used merely for ulterior purposes entirely foreign to the ostensible object of the suit. Nor will it permit a plaintiff to traffic in such process for purely speculative purposes. In every aspect of the case personal to himself, or as the self-authorized representative of other stockholders (none of whom has indeed appeared or come in except to protest against the suit), the plaintiff fails. There are averments in the complaint which seem to indicate that the plaintiff either supposes his bill to be filed upon behalf of the community, or else that the state of public opinion and feeling is a legitimate factor in support of his stockholder's bill. The latter is the only correct view of the plaintiff's attitude, and it may well be understood that the remedy, so far as the public is concerned, is not in the hands of individuals seeking personal ends, but with the chosen representatives of the people in the legislative body. It is there and there alone that the power lies and the responsibility rests."

The motion for an injunction was denied and the temporary injunction dissolved with \$10 costs.

A Telegraphic Controversy Settled.

An interesting controversy as to priority of invention has been going on before the Patent Office for the past two years between Alexander Graham Bell, the telephone inventor, and David Brooks, of Philadelphia, the well-known electrician. The invention in dispute was the use of a return wire on a telephone circuit, to prevent the noises of induction. On some of the city telephone lines the noise produced by induction from electrical currents is so great as to form a serious obstacle to the use of telephone instruments. If one attempts to listen there is such a loud bubbling noise heard, and such a mixture of clicks and other voices, which come in from the neighboring wires, that the principal satisfaction of conversing with one's correspondent is taken away. If the telephone wire passes in the vicinity of Western Union wires, on which Gray's harmonic telegraph instruments happen to be at work, then there is added to the general confusion of tongues a series of tootings or cat calls that are quite distressing to the ears of sensitive telephoners.

Professor Bell and Professor Brooks discovered the remedy; it consists in using two wires on the telephone circuit instead of a single wire. If an extra wire, insulated, is stretched close alongside of the usual single wire, the extra being employed as a return circuit wire, instead of the earth, then all noise from induction disappears, and telephoning becomes a pleasure.

The Commissioner of Patents decides that the priority of invention belongs to Professor Brooks, he having made the invention in July, 1877, whereas Bell did not make it until the end of August, 1877. But, more than this, Bell's date of invention must, by law, be carried forward to the date of the final enrollment of his English patent, May 18, 1878; as it is not allowable, in this country, so far as proofs of invention are concerned, for any applicant, if he takes a foreign patent before he applies for an American patent, to go back of the date of his foreign patent. Bell did not apply for his American patent until December 30, 1878. The Commissioner of Patents, therefore, reversed the decision of the Board of Examiners in Chief, and awards the discovery to Professor Brooks, to whom it clearly belongs.—*Scientific American*.

The Blue Boxes.

From the *Chicago Tribune*.

"Say, what is the manin'," says Patrick to Murphy.
"Of all the blue boxes I see on the street,
That's standin' like sentries, but barrin' the sengers
To tramp up and down in the shnow an' the shleet!"

Says Murphy to Patrick, "Thim same is to bother
The boys wid the ahtars, and to keep them awake;
An' iv'ry half-hour they must give up their freedom
To give the alarm, and their shlumbers to shake."

"And inside there's a box, wid a devil's tail hangin';
Ye jist pull it down, alsy-like, don't you see?
An' it tells to the station yer there at yer duty,
As plain, Paddy, now as as I'm speakin' to ye."

"Inside of the box there's a tillyfone waitin';
Ye shpake to an inkstand—the Captain hullo;
And thin, mind yer eye, if ye shpake to the Captain,
Ye'd better braithe alsy, and not be too close."

"Thim tillyfone chaps that McGarigle's usin',
They shmell iv'ry thrap ye've been tastin' the night,
Git on to yer shyle, and they see where ye've bin to,
And ain't takin' stiffs, though they be mighty bright."

"O but I'm mighty glad that I'm not on the force now—
I couldn't in honor keep friends wid thim things.
Karacters is busted, and gone to the divil,
Since lightnin' is doin' sich work for the rings."

"Wid these, sir, the boys can't get up half a shindy
Before the alarm brings the wagon aroun';
An' bedad, sir, they'll gobble the whole of a party
Before the first man's fairly laid on the groun'."

"Ah! onot I was proud of my star and my billy;
I walked like a turkey-cock, happy and free;
But now, sir, I wouldn't be under McGarigle;
No, sir, I thank ye—not any for me."

"They say out in Leadville there's freedom in plenty,
Say, Pat, let's go West and grow up wid the noise—
For here, where a street is patrolled by a shanty,
The force is a-gittin' too fly for the boys!"

—NEW-MAN.

In explanation of the above it should be stated that Chicago is rapidly adopting the telephone police exchange system by which every patrolman is required to report every half hour, by turning in a signal, to the central station of his district. The "blue boxes" are alarm houses which contain an American District Telegraph signal box, modified to adapt it to the purpose, and a telephone. At the central station there is a relay of men in reserve, with wagon, etc., to answer calls when needed.

Journal of the Telegraph.

PUBLISHED SEMI-MONTHLY AT 195 BROADWAY.

J. N. ASHLEY,

EDITOR.

THE JOURNAL is issued on the 1st and 16th of each month. Its circulation is over 10,750, and is steadily increasing. It goes to every State, Territory and Province on the Continent. No better medium for advertising exists.

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Nothing inserted for less than one dollar.

A reasonable discount will be allowed on advertisements to remain standing, for which special arrangements can be made.

NEW YORK, FEBRUARY 16, 1881.

Executive Appointments.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, February 12, 1881.

Executive Order No. 192.

1. General Thomas T. Eckert has been elected Vice-President and General Manager of this Company, and placed in charge of the construction, equipment, maintenance and operation of the lines and offices. His authority and orders as such will be respected.

2. Vice-President John Van Horne will continue in charge of the electrical department, line statistics and contracts.

3. Acting Vice-President John B. Van Every will continue in charge of the accounting department and of settlement of all dues and liabilities.

4. David H. Bates has been appointed assistant to the General Manager.

NORVIN GREEN,

President.

Telegraph Offices in Texas Closed on Sundays.

THE attention of managers and receivers is called to the fact that the Penal Code of Texas requires that telegraph offices in that State shall be closed on Sundays, under a penalty of prosecution should the law be violated. The company has received notice to hereafter not open its offices in that State on that day, and that if this law should be violated prosecution will follow. All messages taken for Texas offices should be received subject to the delay which may arise from the enforcement of this law.

UNDERGROUND TELEGRAPH LINES.

In our last issue an account was given of the destructive effects of the sleet storm which visited this city and its vicinity on Friday, the 21st ult. The damage done in this city and within a radius of thirty miles was very great, and the interruption to telegraphic communication very serious, entirely suspending it for several hours.

The inconvenience experienced caused by this storm has brought up prominently the problem of putting the wires under ground, and legislative action has been invoked to compel telegraph companies in this and adjoining States to make such a change in their system, at least in the large cities, where the overhead wires are inconveniently numerous.

There is an evident misapprehension in the public mind in regard to this matter, at least so far as the Western Union Company is concerned. Instead of opposing such a disposition of the wires, especially in this city, they have been for some time diligently seeking for a reliable and practicable underground telegraph system, and have already expended a large amount of money in the effort to develop such a system. The company is still diligently laboring to accomplish this purpose, and as soon as a system can be decided upon which will meet the requirements, and that will warrant the large expenditure which must necessarily be incurred in carrying out the work will be prepared to act promptly and effectively.

The problem presented is a most difficult one to solve, as was very tersely shown by Dr. Green in his argument before the Senate Committee on Miscellaneous Corporations, at Albany, last week, an abstract of which is given on our first page. Putting the telegraph wires under ground, even in the larger cities, involves very large expense, and the managers of telegraph companies are compelled to act slowly and cautiously in the matter. It is a fact not understood or appreciated by the public that there are great and special difficulties experienced in working underground lines, and notwithstanding the claims of inventors, and the sweeping assertions of the newspapers and of persons who have no knowledge of the subject, no system has as yet been demonstrated to be so perfected as to insure its success, if adopted. As before stated, the managers of the Western Union Telegraph Company have been for a long time seeking for a practicable and reliable underground telegraph system. Material progress has within the last two or three years been made towards the solution of the difficulties and obstacles encountered. That the efforts to accomplish this will be ultimately successful we have no doubt. The demand for it is so urgent, and so many electricians and inventors are working in this direction, that the devising of such a system seems now to be nearly assured.

Another point which is not generally understood, but which is effectively demonstrated in the address referred to is, that while it will probably soon become practicable to put the trunk lines under ground,

there is a large and indispensable telegraph service which could not bear the great expense that would attend such a general disposition of the wires. The Western Union Company alone has in this city 113 short lines to branch offices, and to private parties. If compelled by law to bury all their city wires, most, if not all of these, would of necessity have to be abandoned, as the profit derived from the branch offices would not warrant incurring the expense, and the private parties who now lease wires could not afford the largely increased rental which must be charged them in that event. And this objection applies even more forcibly to the Gold and Stock, Telephone and American District systems. These have come to be so universally employed, and have proved so useful, that they have become a necessity; and any interference with, or suspension of the facilities they afford would be regarded by the public as intolerable.

It is very easy for individuals to demand the replacing of the present, it is conceded, unwieldy and troublesome mass of aerial wires in cities by a system of subterranean lines, and for legislatures to enact that it shall be done within a certain time, but doing it is quite a different matter, as telegraph managers have discovered to their cost.

Notwithstanding the general public demand for this improvement, municipalities seem disposed to hinder and delay, rather than promote it. Some months ago a subterranean cable with a large number of wires was laid by the Western Union Company from Newark to Jersey City, to be connected by a river cable with the New York main office, to be extended from Newark to Elizabeth, for the purpose of testing the system during the winter; with the view, should the experiment prove successful, of adopting it for its city lines here and elsewhere. To the surprise of the company it has been impossible thus far to obtain the necessary permission from the municipal authorities of Newark and Jersey City to lay this cable through the streets of those cities, and the cable, already put down, with the exceptions noted, has lain for months, and still lies idle and useless, and the desired experiments rendered impossible. During the interruption of the overhead wires in this city caused by the storm, wires were working south from Elizabeth, and had this cable been available, communication in that direction could easily have been maintained, to the great advantage of the public as well as the company.

What reasons the municipal authorities of Jersey City and Newark may have for thus opposing and delaying an important improvement which must largely benefit their cities, is, of course, known only to themselves. They should certainly be important ones to thus stand in the way of a great public benefit.

Organization of a New York Electrical Society.

For several years we have persistently advocated in *The Telegrapher* and the *JOURNAL OF THE TELEGRAPH*, the organization of an Electrical Society in

this city. From the large number of electricians and telegraphists residing and employed in this city and its immediate vicinity, it would seem to be an easy matter to establish here a large and influential society, but such has not proved to be the case. Previous efforts to establish such an association have been so indifferently responded to that they have been necessarily abandoned.

At length, however, there is a good prospect of success. The proceedings of a meeting for the purpose of considering the subject, and the preliminary organization of a New York Electrical Society, on Tuesday evening, the 8th inst., will be found in another column. The attendance at that meeting was much larger than we had anticipated, and the interest manifested in its object, and the enthusiasm of all present indicated that this time business was seriously intended, and that a permanent organization would result.

It is unnecessary for us to set forth at length the benefits to be derived and the advantages certain to result from such an association intelligently, energetically and properly conducted. These have been shown by the experience in Chicago and other cities where they have been established and maintained. There are here abundant elements for creating a very large, strong and useful society, and we hope that our electricians and telegraphists generally will co-operate with those who have initiated the movement to make the New York the leading local electrical society in this country. We shall be pleased to aid in any way within our power in accomplishing this purpose, and are confident that now the time and labor devoted to it will not be in vain.

We would especially call attention to the adjourned meeting to be held at the United States Hotel, at 8 o'clock P.M., on Wednesday the 23d inst., when we shall expect to see the rooms crowded, and large additions made to the membership of the society, which will then be permanently established, and the organization of which will be completed.

The following notice of the adjourned meeting has been issued, and is addressed to all who are interested in electrical science and the telegraphic art:

NEW YORK, February 13, 1881.

At a meeting of prominent telegraphers and gentlemen in various departments of the electrical profession, held in the parlors of the United States Hotel, corner of Fulton and Pearl streets, Tuesday evening, 8th inst., it was unanimously resolved to organize a Society for the advancement of electrical knowledge and the study of electrical and other scientific phenomena.

A permanent organization will be effected at a meeting to be held at the same place on Wednesday evening, February 23d inst., at 8 o'clock.

Your presence and co-operation are cordially invited.

F. W. JONES,
Chairman, pro tem.

J. W. MORELAND,
Secretary, pro tem.

Resignation of Vice-President Anson Stager.

THE consolidation, and the changes consequent thereon, have enabled Vice-President General Anson Stager to realize the purpose which he has for some time past had, to retire from participation in active

executive telegraphic management. General Stager's connection with the Western Union Telegraph Company, under its different names and organizations, has extended over thirty years. During that time it has grown from a local organization covering 600 miles of lines and twenty offices, with a capital of \$300,000, to a national enterprise covering the United States and a portion of Canadian territory, with over 300,000 miles of wire, 10,000 offices and a capital of \$80,000,000. In the persistent and arduous labor which has had such splendid results in establishing the most extensive and best telegraphic system in the world, General Stager has borne a prominent part, and has exhibited ability and enterprise of a high order, and has well earned the relief from exacting duties which he has desired and now secured. His late associates in the management of the Western Union Telegraph Company regret to lose his personal participation in their important and laborious duties, and he has their best wishes for his future happiness and prosperity. He remains a director of the company, and in that position will still further aid in maintaining and extending the great telegraphic system which he has so materially aided in originating and establishing.

The following communication tendering his resignation of the office of Vice-President, and the complimentary resolutions of the Executive Committee of the Company thereupon will be read with interest:

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, January 31, 1881.

NORVIN GREEN, President:

DEAR SIR—I have for some time past contemplated retiring from active duty with this company. The opportunity now occurs for carrying out my plans with the least embarrassment to the company, and I herewith tender my resignation as Vice-President, and respectfully request acceptance of the same by the Executive Committee.

My official connection with this company commenced in the year 1851, when its capital was \$300,000, operating 600 miles of line, and but twenty offices. I have been in its service without interruption to the present time, and I now retire with the highest regard and personal esteem for its executive officers and others with whom I have been so agreeably associated.

Very Respectfully Yours,
ANSON STAGER.

At a meeting of the Executive Committee, held on Friday, February 4, the above letter of resignation was presented, and the following resolutions were adopted:

Resolved, That in the retirement of General Stager from active participation in the executive management of the telegraph business, the company realizes that it sustains a great loss. Starting in the primary grades of telegraph service, he has, by his great energy, ability and undoubted fidelity, steadily advanced to the second highest position in the executive management, in which position he has abundantly proved that he well merited his promotion.

Resolved, That his resignation of the office of Vice-President be accepted, and that his salary be continued for the term for which he was elected.

Seventh Annual Reception and Ball of the Chicago Telegraphers.

WE are under renewed obligations to the Chicago Telegraphists, for an invitation to attend their Seventh Annual Reception and Ball, and regret our in-

ability to avail ourselves of their kindness, for which we return our thanks.

The entertainment will be given in Martine's Hall, 55 So. Ada Street, on Thursday evening, the 24th instant. The previous similar entertainments have satisfactorily demonstrated the expertness and efficiency of the Chicago brethren in terpsichorean as well as the more serious telegraphic and scientific matters, and those who are so fortunate as to be present on the present occasion, are promised, and will, no doubt, realize, an even more pleasant and enjoyable time than those which have preceded it—if that be possible.

BUSINESS NOTICE.

ATTENTION is called to the full page Advertisement of BUNNELL'S New Steel Lever (Solid Trunnion) Key, in this paper. To persons desiring to purchase telegraph keys, the unequivocal endorsement of this Key by the most expert telegraphists as the *very best in all respects* manufactured, is an unquestionable guarantee that its merits are not overstated.

LITERATURE.

The Indications of Character, as manifested in the general shape of the head and the form of the face. Illustrated. By H. S. Drayton, author of "Light in Dark Places," "Brain and Mind," etc. 12mo. Price in paper, 15 cents. FOWLER & WELLS, Publishers, 763 Broadway, New York.

This compact and neatly printed pamphlet treats in a clear and popular style of an old subject, but discusses it in a manner quite different from what we are accustomed to. It takes physiognomy out of the realm of conjecture and speculation, and gives it a scientific character; points us, in fact, to rules and procedures by which character may be practically diagnosed, and trustworthy conclusions obtained in any given case. One object of the author appears to be to show that the craniologists or phrenologists are by no means alone in the study and determination of the physical indications of character, but that scientists of prominence in Europe and America give them the weight of their authority and attention. As an introduction to the study of the physiology of the mind, it is a valuable treatise, and to those who have not the time or opportunity to pursue the subject in detail, it will be found both interesting and useful. To teachers and all who have much to do with others, old or young, it will be especially serviceable. Sent by the publishers on receipt of the price, 15 cents, in stamps.

Correspondence.

COMMUNICATIONS intended for publication must, to receive attention, be accompanied by the name and address of the writer, not necessarily for publication, but for the information of the Editor, and as a guarantee of good faith.

THE TELEGRAPH IN ARIZONA AND NEW MEXICO.

LOS ANGELES, CAL., Jan. 21.

To the Editor of the Journal of the Telegraph:

It may not be uninteresting to know what is being done in the to you far off territories in the way of extending telegraphic facilities. You are, of course, aware that the "star of empire" has turned upon its track, and is now sweeping eastward, but may not know that at my present writing one wire is within thirty miles of El Paso, Texas, and that a second

wire has reached a point seventy miles this side of that city, where the Atchison, Topeka and Santa Fe Railroad will connect with and cross the Southern Pacific road on its way to Guymas, in the Mexican state of Sonora. This second wire has been hung expressly to connect with the wire approaching from the east by the A., T. and S. F. R.R., and it is expected that the last joint will soon be soldered, and probably ere this shall be printed, the circuit will be continuous across the territories of New Mexico and Arizona to the Pacific States. We have thus two fine working circuits of 720 miles eastward from this "home of the angels." But the Pacific Division management are not content with this, and are busily at work now on the second line of poles, and so soon as the work can be pushed to completion, we shall have three wires all the way from San Francisco to the western boundary of Texas.

The work alluded to is all within the limits of the Fourth District of the Pacific Division, and keeps the "Commodore" in charge sailing about very lively. Since the 1st of April, 1880, there has been added to this district 325 miles of poles and 1,050 miles of wire, and the work now in hand will add 500 miles more of both poles and wires.

The Southern route is sure to become the favorite one for telegraphic communication. There are no snow storms to load down and break the wires, no fogs to steal away the subtle fluid; and in all this distance hence to the Texan line, not one solitary tree to endanger the wires or to interfere with insulation.

The rich mineral developments in our eastern adjacent territories are affording a fine telegraphic business, and but for the fact that it is a long distance between towns, it would be very profitable. But we look to the future with a hope well grounded that larger towns and more of them will give a good return for the heavy investments now being made to assist the development of the richest mineral regions in the world.

COMMODORE.

Advantages of the Second Division T. M. B. Association.

To the Editor of the Journal of the Telegraph:

I arise to second the motion of "Vigo" in his communication in your last issue, upon making an effort to awaken an interest among telegraphers in the Second Division of "The Telegraphers' Mutual Benefit Association." The assessments of the First Division amount to about one dollar per month, or twelve dollars per year, for which the member's family, at his death, will receive \$1,000. The knowledge of this, to a man who has a family, is worth all its costs; but a large portion of this will be used up in defraying the expenses of the last sickness and the funeral expenses, so the family would not have enough to keep the "wolf from the door" for more than a short time, provided he was dependent upon his daily exertions for a livelihood, so that the reflections of having a thousand dollars at his death are not so pleasant as they would be if he could say that after all the expenses of the last rites had been paid his family would have over a thousand dollars. This can be obtained in a short time if each interested party will adopt the motto for himself, "now is the time, while I am well, to provide for my family when I am gone," and walk right up to the captain's office and subscribe. Let others do as they please. Your going will perhaps induce another, and another, and another, and so on until, before you are aware of it, the Second Division will be in as good condition and as strong as the First. Try it, ye laggards, and see if I am not correct. If you got your spunk up because, in the start of this division,

you were required to tell all about your great grandparents, when, from your own personal knowledge, you didn't know that you had any such, you should not bite off your own nose, for, "like Captain Scott's coon, they have come down," and you are now required to give no other than reasonable information. Now, who is the first one to send in his name? Ask the Secretary privately if you are not the first.

SECOND DIVISION.

Copper Deposits in Local Batteries.

BELL CREEK, NEB., Jan. 29.

To the Editor of the Journal of the Telegraph:

Will you please answer the following questions in the JOURNAL OF THE TELEGRAPH?

1. In a local battery is the deposit on the copper conductor pure copper?

2. Does it in any way impair its efficiency as a conductor?

F. D. K.

[Answer—1. It is chemically pure copper. 2. No.]

The Telegraph.

CONSOLIDATION COMPLETED.

ON Thursday, the third instant, Judge Barrett handed down his decision, denying the application in the Hatch suit to continue the injunction to restrain the proposed consolidation of the Western Union, Atlantic and Pacific, and American Union Telegraph Companies.

Meetings of the stockholders of the three companies were then held in this city, and the agreement for consolidation entered into by the directors of these companies, January 19th, were ratified by a vote of more than three-fifths of the stock of each company, and formal possession was taken by the Western Union Company of the lines, offices, etc., of the Atlantic and Pacific and American Union Companies, and the signs and blanks of the former company were substituted for those heretofore used by the other two companies.

The following announcement was accordingly officially made by the President of the Western Union Telegraph Company:

OFFICE OF THE WESTERN UNION TELEGRAPH CO.,
NEW YORK, Feb. 3 1881.

The Western Union Telegraph Company having this day completed the purchase and taken possession of the lines, properties, rights and privileges of the American Union Telegraph Company and of the Atlantic and Pacific Telegraph Company, David H. Bates has been duly appointed agent of this company, and general manager of the lines, offices, and operations of the properties and rights turned over by the American Union Telegraph Company; and Albert B. Chandler has been duly appointed agent of this company, and general manager of the properties and rights turned over by the Atlantic and Pacific Telegraph Company, until further notice of a concentration of management.

All officers and employees of either of said companies will be retained in the service of this company till further notice, and all business done and revenue accruing in the operation of said lines will be reported and turned over to this company.

NORVIN GREEN, President.

The following letters passed between General Eckert and Mr. Van Horne, and similar letters passed between President Chandler, of the Atlantic and Pacific Company, and Mr. Van Horne:

DR. NORVIN GREEN, President Western Union Telegraph Company New York City.

Dear Sir:—Having been officially notified by Messrs. Augustus Schell and John Van Horne, vice-presidents of the Western Union Telegraph Company, that that company has deposited the scrip

certificates called for by the agreement between the Western Union, Atlantic and Pacific, and American Union Telegraph Companies, dated January 19, 1881, and the supplemental agreement thereto between the same companies, dated February 3, 1881, I hereby in conformity with the said agreements deliver to the Western Union Telegraph Company possession of all the telegraph lines, properties, moneys and effects of the American Union Telegraph Company covered by the said agreements of sale. Yours truly,

THOMAS T. ECKERT.

President of the American Union Company.

NEW YORK, Feb. 3, 1881.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Feb. 8, 1881.

General THOMAS T. ECKERT, President American Union Telegraph Company, No. 135 Broadway, New York.

Dear General:—In reply to your letter of this date addressed to Dr. Norvin Green, president, I hereby, as a vice-president of the Western Union Telegraph Company, and in its behalf, accept and take possession of all the telegraph lines, properties, rights, moneys and effects covered by the agreements referred to in said letter; but it is the wish of the Western Union Telegraph Company, and agreeable to myself, that you continue in charge of the property as the agent of the Western Union Telegraph Company until other arrangements shall have been made. The Western Union Telegraph Company will compensate you for the services rendered by you as such agent. Truly yours,

JOHN VAN HORNE, Vice-President.

The formal meetings of the stockholders of the Western Union and Atlantic and Pacific Telegraph Companies previously notified were held at the Executive Offices of the respective companies on Saturday, February 5. That of the Western Union Company met at 12 o'clock M., and the polls remained open until one o'clock P. M. Of the stock of the company 74½ per cent. was represented, and 307,225 shares voted to ratify the action taken January 19 and February 3, and 600 shares against ratification.

Immediately upon the adjournment of the stockholders' meeting the Board of Directors of the company met. Mr. Hamilton McK. Twombly resigned as Vice-President and Director, and Mr. Chester W. Chapin resigned as Director. Mr. Jay Gould was elected a Director in place of Mr. David Jones, deceased; Gen. T. T. Eckert in place of Chester W. Chapin, and Mr. Russell Sage in place of Mr. H. McK. Twombly. Gen. Eckert was also elected Vice-President in place of Mr. Twombly, and Mr. Gould a member of the Executive Committee in place of Mr. Twombly.

Gen. Anson Stager, at a previous meeting of the committee, tendered his resignation of the office of Vice President, which was accepted, and complimentary resolutions in recognition of his long, faithful and efficient service to the company, and continuing his salary as Vice-President until October next, the end of the year for which he was appointed, were adopted.

Immediately after the adjournment of the meeting of the Western Union Directors, the meeting of the Atlantic and Pacific Company was held. About 104,000 of the 140,000 shares of stock were represented, and were all cast in favor of consolidation.

The formal meeting of the stockholders of the American Union Telegraph Company was held at the office of the company, 117 Broadway, on Monday, Feb. 7. Of the shares of the company 68,000 were represented, all of which were cast in favor of ratifying and confirming the action previously taken for consolidation.

This action completed legally the action required to establish the consolidated Western Union Company, representing the parties to the agreement.

The New Mexican Lines and Cable.

THE line from Brownsville, Texas, to Matamoras is now open, and business will be received for points in Mexico via Matamoras. The cable between Brazos, Santiago, and Tampico is completed, but will not be used for business until the section from Tampico is laid and the whole line completed. It is expected that this will be accomplished in a few days.

Newspaper Telegraphs.

THE desirability of having immediate and absolute control of telegraphic facilities in certain emergencies has led to the leasing of telegraph wires by newspapers. The *London Times* has some short ones; the *New York Tribune* has a wire between New York and Washington; the leading papers of Cincinnati are similarly connected with Washington; and recently the *Chicago Inter-Ocean* has taken what is probably the longest wire leased by any newspaper, connecting its editorial rooms with its news bureau in Washington. All messages are sent direct, the paper having exclusive use of the wire and employing its own operators.

The Telephone in India.

THE Government Telegraph Department in Calcutta appears to be following the lead of the Postmaster-General in this country. In November last they obtained a supply of some thirty of the loud-speaking telephones of the Gower-Bell Company for experimental trials, and we understand that the results have given so much satisfaction that the company has now received by telegraph a substantial order for a large number of its instruments. If this may be taken in conjunction with the recently announced refusal of the Government of India to sanction the setting up of telephonic exchanges on the part of private speculators, it would seem to indicate a resolve on the part of the executive to itself supply the Indian public with what will soon be found to be an indispensable aid to the business and pleasure of life in India.—*The Electrician*.

The Anglo-American Telegraph Company—Half-Yearly Report.

THE report of the Anglo-American Telegraph Company shows that the total receipts for the half-year, ended December 31, 1880, were £220,910. The traffic receipts have declined by £170,166, owing to the competitive tariff in force during the greater part of the period. The expenses have been £58,344, and the available balance, after setting apart £75,000 to the renewal fund, £87,566. From this a dividend of 15s. per cent. is proposed on the Ordinary Stock, £1 per cent. on the Preferred, and 10s. per cent. on the Deferred Stock, making a total distribution of 3½ per cent. on the Ordinary, the usual 6 per cent. on the Preferred, and ½ on the Deferred, carrying £66 to the current account. The report refers at length to the suit to restrain the directors from paying dividends "without having assets to represent capital," which was commenced in November last by a holder of £50 of Deferred Stock whose name appeared on the register for the first time in the previous month. The directors have been advised by counsel that the plaintiff will fail in establishing his case, but that if the Court were to decide in the plaintiff's favor, the board might be held personally liable to the company for any dividends paid without the sanction of the Court. Under the circumstances, the directors have decided not to pay the dividend now recommended until these proceedings are at an end, or the Court has authorized the payment.

Telegraphic Notes.

THE Central South American Telegraph Company filed articles of incorporation, at Albany on the first instant. The capital is stated at \$5,000,000. The lines are to extend from New York to Texas, thence to Mexico, thence to South America. Jonathan Edwards, James A. Scrymser and Alfred Pell, all of New York, are the stockholders.

Northwestern Division of the U. S. Military Telegraph Lines.

FROM an article in the *Bismarck Tribune*, the following account of the Northwestern Division of the U. S. Military Telegraph lines is condensed. The construction of the lines in this division was commenced from Bismarck, in the summer of 1878, and extended through Forts Stevenson and Buford, in Dakota, and through Fort Keogh to Fort Custer, in Montana. From Keogh a line was constructed to Deadwood, D. T., the total length of line being 646 miles. Lieut. Greeley was relieved Nov. 12, 1878, by Lieut. G. S. Grimes, 2d Artillery, A. S. O., who took up the work at this point, extending the line from Fort Custer to Fort Ellis and Bozeman, and from Deadwood to Fort Mead, a construction of 208 miles, which was completed January 30, 1879.

The additions made to the Northwestern system of telegraph in the season of 1879 was 798 miles of line, connecting Bozeman with Fort Assiniboine, the northern terminus, through Radersburg, Helena, Forts Shaw and Benton. From Helena a branch line was extended through Deer Lodge and New Chicago to Fort Missoula.

The connections made in Dakota were no less important. The telegraph terminus at Fort Mead was extended east to Rapid City, Forts Bennett and Sully, thence north through Forts Yates and A. Lincoln to Bismarck, making a complete metallic circuit of nearly 900 miles. During the past summer of 1880 the line was extended from Fort Missoula west across the Cœur d'Alene Mountains to connect with the system of U. S. Military Telegraph lines in Idaho and Washington Territories, built about the same time, under the supervision of Lieut. W. E. Birkhimer, 3d Artillery, A. S. O.

Sohans Pass, Cœur d'Alene Mountains, marks the western terminus of the Northwestern Division and the eastern terminus of the Washington and Idaho Division.

The total mileage of lines in the two divisions is 2,013, of which 1,752 miles belong to the Northwestern Division, under the superintendency of Lieut. G. S. Grimes, A. S. O., and 261 miles belong to the Washington and Idaho Division, under the superintendency of Lieut. C. A. Booth, 1st U. S. Infantry, A. S. O.

The principal office of the Northwestern Division is at Bismarck, D. T., connecting with the N. W. Telegraph Co.'s lines for all eastern points. At Helena, M. T., and at Deadwood, D. T., connection is made with the W. U. Telegraph Co.'s lines. Another connection with the N. W. Co.'s lines is made at Fort Sully, D. T. Thus the system of U. S. Military Telegraph lines in the Northwest has five points of connection with the great lines of the country, viz.: Bismarck, Fort Sully and Deadwood in Dakota; and Helena, M. T., and Dayton, Washington Territory. The headquarters of the Washington and Idaho Division is at Dayton, Washington Territory, at which point connection is made with the system of private lines on the Pacific coast.

It is not unlikely, if the necessary appropriations can only be secured from Congress, that during the coming summer the military telegraph lines will be constructed to the site of Fort Maginnis, M. T., the new post now being built in the Judith Basin coun-

try south of the Missouri River, and in the vicinity of the 109th meridian. This connection will probably be made from Fort Buford, D. T., and be extended through the cantonment on Poplar River and Fort Peck, both important military points.

The military telegraph lines are constructed principally for public or Government purposes, but they also do commercial business at points not reached by commercial lines. Their stations take in every point on the frontier where the United States troops concentrate, and also all the points in Dakota west of the Missouri River and Montana, that are supply points for the settlers. This places the military in immediate communication with department headquarters at St. Paul.

Lieut. Geo. S. Grimes of the 2d U. S. Artillery, on detached service as acting signal officer, has charge of the Northwestern Division. Prior to Lieut. Grimes being ordered in charge of this division, he held a similar position in the Texas Division, and has had large experience. Under his supervision the largest part of the Northwestern Division has been constructed. Unassuming and accommodating, strict in the performance of his duties, he enjoys the esteem and respect of the entire body of men under his charge.

Aside from the Northwestern Division, which is but one artery of the system of military telegraph lines, are the divisions that cover similar territory in Washington and Idaho, Arizona, New Mexico, California, and Texas, and aggregate in extent 6,000 miles of line, over 5,000 of which cover the frontier and connect all important military posts and towns in those sections. The entire line is under the control of the Chief Signal Officer at Washington, and operated by Signal Service men, supplemented by details of repairmen from the various military posts.

Foreign Telegraphic Notes.

A news despatch from London states that the Master of the Rolls has ordered the winding up of the Edison Telephone Company, whose business has been sold to the United Telephone Company. Mr. Edison's representatives fruitlessly opposed the winding up.

A prospectus has been issued in Paris of the Central American Submarine Telegraph Company, the object of which is to connect all of Central America with the United States and Europe by cable, with tributary land lines, to be laid from Belize to Cuba, Spain having granted a concession therefor. England will guarantee for a term of twenty years the payment of the sum of £1,000 annually as the proceeds of government telegrams to and from British Honduras. The capital of the company is to be £120,000.

The Electrician says that it understands that Mr. Fawcett, Postmaster-General of Great Britain, has handed over to the Civil Service Commissioners the right exercised by previous postmasters-general to nominate candidates for the telegraphic service.

Applications have been made to the municipalities of Cadiz and Seville, Spain, for permission to establish a system of telephones in those cities.

The Electrician of January 22, says: The unprecedented snow storms and gales raging during the early part of this week have caused extensive interruption of telegraphic communication throughout the country, and when we went to press public notice of delay to all parts was still in force.

The Brest, St. Pierre, cable of the Compagnie Française du Télégraph de Paris à New York was repaired Sunday night, January 16, at a distance of forty miles from Brest, by the French company's repairing steamer, *Pouyer-Quertier*.

The Eastern and South African Telegraph Company announce the restoration of telegraphic communication with Cape Colony, Orange Free State, and Griqualand East.

The Scottish Telephone Exchange Company has, in answer to an application, received from the Postmaster-General a form of proposed license which contains very onerous restrictions as to the details of working, and indicates a high scale of royalties. The company is negotiating with the view to obtain some modifications.

La Lumière Electrique states that the Minister of Posts and Telegraphs has under his consideration a scheme for replacing existing aerial lines by underground cables.

Miscellaneous.

THE NEW YORK ELECTRICAL SOCIETY.

In pursuance of the call published in our last number, between thirty and forty electricians and telegraphists assembled in the spacious parlors of the United States Hotel, corner of Fulton and Water streets, in this city, the use of which was kindly tendered by the proprietor for that purpose, on Tuesday evening, the 8th inst., to take action in the matter of organizing an electrical society. The attendance under the circumstances was very encouraging, and much interest and enthusiasm in the object of the meeting was manifested by those present.

The meeting was called to order about 8.30 P.M. by Mr. E. A. Leslie, and on motion, Mr. F. W. Jones was called to the chair, and Mr. J. W. Moreland was made Secretary.

The preliminary organization having been effected, the Chairman briefly stated the object of the meeting, and the desirability of, and benefits to be derived from such an organization as was proposed. For encouragement and guidance in establishing an electrical society, he related the experience of the Chicago brethren in establishing a similar association in that city (of which he was formerly president), the inducements and social features resorted to to awaken and maintain an interest in it, and the brilliant success which had attended the effort, until at length it had become a large and flourishing society, and its monthly meetings were eagerly looked forward to, and largely attended.

The advisability and desirability of establishing such an association in this city, its objects and purposes, and the features which it would be well to introduce to make it useful, attractive and popular were discussed by Messrs. David Downer—who in connection with the present, related the several attempts heretofore unsuccessfully made to organize such a society, and who expressed confidence from the numbers who had responded to the call and the interest manifested that this would be more successful—McGowen, Geo. B. Scott, E. C. Cookey, W. J. Johnston, editor of *The Operator*, F. W. Cushing, and others.

Mr. Cushing offered the following resolution, which was seconded and carried unanimously and enthusiastically:

Resolved,—That we form an Electrical Society; and that a Committee of seven, of which the Chairman of this meeting shall be the Chairman, be appointed to prepare a Constitution and By-laws, and report the same for action at an adjourned meeting.

The Chairman called for nominations for members of this Committee, and the following gentlemen were elected: Messrs. F. W. Jones, Chairman; Geo. B. Scott, E. A. Leslie, F. W. Cushing, J. W. Moreland, E. C. Cookey, and W. H. Baker.

All present handed in their names as the first

members of the Society; and no further business appearing, on motion, adjourned to meet at the same place on Wednesday the 23d inst.

Fire at the Western Electric Manufacturing Company's New York Establishment.

ON Wednesday morning, the 9th inst., what at one time threatened to be a disastrous fire occurred in the extensive manufactory of the Western Electric Manufacturing Company, at Nos. 62—68 New Church street in this city. The fire originated in a bale of excelsior, used for packing apparatus, in the packing department in the basement, and was discovered about 9.30 A. M. The fire spread very rapidly, on account of the inflammable materials stored in the basement, and it was at one time feared that it might extend to the next building which is used for the storage of cotton.

The alarm was quickly given to the Fire Department, and a second and third alarm was promptly sent out, which speedily summoned a number of engine and hook and ladder companies, and their expeditious arrival and effective action sufficed to check the flames and prevent the destruction of the building and valuable machinery with which it is stocked.

At the time the fire occurred there were about 200 employes in the building, but these all escaped without serious injury. A few slight burns and scratches was all the personal injury experienced.

Upon the extinguishment of the fire an examination of the premises showed that the damage was mainly confined to the basement and first floor. The engine and machinery on the upper floors were so little damaged that in the afternoon they were again started up, and the next morning the works fully resumed operation, and business was resumed and continued as before. The damage was mostly to manufactured apparatus and stock, of which a large amount is constantly kept on hand, but this, and the damage to the building is fully covered by insurance.

No serious interruption to the business of the company is experienced, as all the apparatus destroyed is duplicated at the more extensive manufactory of the company in Chicago, and all orders received are and will be promptly filled.

Personal.

The Electrician announces the death of Henry Denison Pender, second son of Mr. J. Pender, M. P., Chairman of the Eastern Telegraph Company, etc. The deceased had recently acquired a proprietary interest in that paper. He was born in October, 1852, and died on the 13th ult., at Footscray Place, Kent, the county seat of his father. In 1878 he went out to Cypress, where he established the first telegraphic cable communication.

Mr. J. W. Burdick has been appointed superintendent of telegraph lines for the Delaware and Hudson Canal Co., with headquarters at Albany, N. Y.

Information in regard to the present address of John Crampton is desired by his uncle, Dr. John Clarke, of Rockport, Texas. Mr. Crampton is a telegraph operator, and when last heard from, about the year 1876, was employed as an operator and express agent or clerk, in Jersey City.

Work of the Patent Office Last Year.

THE Commissioner of Patents has submitted to Congress his annual report of the operations of the Patent Office during the year ended December 31, 1880. There was received during the year for pat-

ents, copies of records or drawings, and from other sources, an aggregate of \$749,685.32. The total amount expended was \$538,865.17, leaving a balance of \$210,820.15. On January 1, 1880, there remained \$1,420,806.56 to the credit of the Patent Fund, which added to the surplus of 1880, makes the amount to the credit of the Patent Fund on January 1, 1881, \$1,631,626.71. The business of the office for the year is summarized as follows: Applications for patents for inventions, 21,761; applications for patents for designs, 634; applications for reissues of patents, 617; total, 23,012. Patents issued, 13,441; patents reissued, 508; patents expired, 3,781; trade-marks and labels registered, 533.

Of the 13,441 patents issued during the year, 12,655 were to citizens of the United States, and 786 to foreigners. The comparatively small expenditure made necessary by the appropriations made by Congress has greatly embarrassed the proper and prompt despatch of business.

MARRIED.

GARRISON—MAINES.—By the Rev. J. S. Gaskill, at Camden, N. J., January 8, 1881, WM. A. GARRISON, operator and ticket clerk West Jersey Railroad, Millville, N. J., and Miss MARY E. MAINES, of Camden. No cards.

PARKER—IRVINE.—By the Rev. W. W. Stewart, at the residence of the bride, Quitman, Ga., January 25, 1881, G. FORTER PARKER, operator, and Miss ANNIE I. IRVINE.

DIED.

BOX.—Entered into rest, Thursday morning, February 3, 1881, at his late residence, South Brooklyn, N. Y., WM. J. H. BOX a native of Texel, Netherlands, in the 62nd year of his age.

BALLARD.—At Ottawa, Ill., February 3, 1881, LOUISA H., wife of C. L. Ballard, manager Western Union Telegraph Company at Ottawa, aged 25 years, 1 month, 16 days.

LOGAN.—At Jersey City, N. J., January 31, 1881, JOHN F., aged 2 years, 8 months, son of James A. Logan, operator Atlantic and Pacific Telegraph, 18 Broad Street, New York.

SMITH.—At her home, Geneseo, Ill., January 21, 1881, ELIZADA, wife of U. M. Smith, and daughter of Mrs. H. O. Chamberlin, aged 37 years. The deceased was formerly an operator in the Western Union service, and her death will be mourned by many friends. T.

OBITUARY.

WILLIAM J. H. BOX.

WILLIAM J. H. BOX, who died at his residence in South Brooklyn, on the third instant, was born on the Island of Texel, in the Kingdom of the Netherlands, on the 7th day of January, 1820. His father, William Bok, was the Chief Justice of the Supreme Court, and the deceased was educated for the legal profession.

He graduated from the University of Utrecht, and soon after entered upon the practice of his profession, that of a Counselor at Law, at De Helder. During his residence in the Netherlands he held several important official positions, having been Vice-Consul of Great Britain from 1855 to 1859; was appointed Vice-Consul of the German Empire in June, 1860; and was also Vice Consul of France from 1864 to 1870, which position he resigned on his removal to the United States. He was also for a time Vice-Consul of Russia.

Mr. Bok arrived in this country in September, 1870, and in 1871, in connection with Mr. Erasmus L. Bennett, engaged in business as introducer of patents, under the firm name of Bok & Bennett. This business he abandoned in 1872 to accept a position with the Western Union Telegraph Company, in this city, as Translator in the office of the Electrician.

Mr. Bok was peculiarly well qualified for this position, as he read and spoke with facility several modern languages.

He continued in the telegraphic service until his death, and as highly esteemed and respected by the officials of the Company and his associates. He was a gentleman of culture and ability, and usually in robust health, and his sudden and unexpected decease shocked and saddened his friends and acquaintances, who sincerely mourn his untimely removal from amongst them. Two of Mr. Bok's sons are engaged in the service of the Company, and they, with their widowed mother, receive the general and heartfelt sympathy to which their great affliction entitles them.

A delegation from the Executive Offices of the Company attended his funeral, and as a last mark of respect escorted his mortal remains to their final resting-place in that beautiful city of the dead—Greenwood Cemetery.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, February 15, 1881.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

GENERAL INFORMATION.

The Tariff Book and Supplement direct that in messages to a number of "other" line offices, in different States and Territories, managers should count and charge for three or more extra words; also, that to some of the offices in question, half-rate and collect messages should not be accepted. All such instructions are hereby cancelled and should be erased from the Tariff Book at once, as messages to the "other" line offices in question are now to be accepted without the additional charges and restrictions referred to. See supplement No. 4, pages 16, 28, 29, 41, 62, etc.

ILLINOIS.

Hereafter the tariff to 307 Lawndale, Cook Co., will be the same as the rate to Chicago. S.

INDIANA.

* Decatur is now a W. Union office, square 252. a.

IOWA.

* LeClaire is now * LeClaire 25 and 1 by telephone, from Davenport. a.

KENTUCKY.

223 Marshall, closed.

LOUISIANA.

415 Balme changed to 415 Bayne. S.

MASSACHUSETTS.

* Swampscott is now * Swampscott, 50 cents delivery from Lynn. a.

MEXICO.

The "tariff for other lines" to the following places named in the JOURNAL of February 1st, 1881, should be made to read as follows:

Acahuacan,	462 42	Perote,	425 40
Alvarado,	400 39	Rinconada,	400 38
Cosamaloapam,	440 41	San Andreas Calchi-	
Hacienda de San Nicolas,	440 41	comula,	450 41
Jalacingo,	500 45	San Marcos,	400 38
Jalapa de Vera Cruz,	400 38	San Martin Texmelucan,	450 41
Medellin,	575 37	Tezuitlan,	475 43
Minatitlan,	475 42	Tlacotalpam,	412 40
Pachuca,	475 43	Tlapacoyan,	512 46
Papantla,	550 48	Tuxpam,	575 51
Paso de San Juan,	375 40		

MICHIGAN.

* Clarkston now free, by telephone, from Clarkston Station. S.

MONTANA.

532 Sheridan, closed. S.

NEW BRUNSWICK.

* Flaggs Cove and * Woodwards Cove are on the Island of Grand Manan, and * Welchpool is on the Island of Campobello. S.

NEW HAMPSHIRE.

27 Bethlehem Depot P. O. A. is Pierces Bridge. S.

27 Wing Road P. O. A. is Alder Brook. S.

NEW MEXICO.

562 Chamita, closed. S.

NEW YORK.

101 Nunda is now * Nunda, free, by stage from Dalton.

NORTH CAROLINA.

* Gibbons store is now a W. Union office, tariff 25 cents more than Old Hundred, check direct. S.

NOVA SCOTIA.

2 Great Village reopened.

OHIO.

170 Navarre should read Navarre Station. a.

PENNSYLVANIA.

47 Palmer Station changed to 47 Makefield. S.

59 Spring Mill is in Montgomery Co. a.

84 Spring Mills is in Centre Co. S.

47 Willett changed to 47 Neshaing Falls. S.

QUEBEC.

* Melochville, closed.

TEXAS.

The laws of Texas require that telegraph offices in that State shall be closed on Sundays; messages to Texas will, therefore, be accepted, subject to whatever delay may be caused by the laws referred to.

588 La Parra P. O. A. is now care of Brownsville.

Hereafter the "tariff for other lines" from Austin to Georgetown will be 25 and 2, and to Lampasas Springs 50 and 3. S.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

ALABAMA.

* Clayton (H. R.), 40 3 Eufaula.

FLORIDA.

* Fort Beld, 50 cents, special messenger, from Sanford.

* Longwood, 10 cents, by train, from Sanford.

* Maitland, 10 cents, by train, from Sanford.

* Orlando, 10 cents, by train, from Sanford.

GEORGIA.

227 Bullards.

ILLINOIS.

* Cable, 25 2 by telephone, from Milan.

* Pre-emption, 25 2 by telephone, from Milan.

* Reynolds, 25 2 by telephone, from Milan.

307 South Lawn, Cook Co.

* Taylor Ridge, 25 2 by telephone, from Milan.

INDIANA.

290 Farmersburg.

* Soldiers' Orphan Home, 25 cents, by telephone, from Davenport.

* Sisters of Mercy Hospital, 50 cents, by special messenger from Davenport.

IOWA.

426 Coaltown

KANSAS.

535 Aubrey.

595 Pierceville.

457 Rich Hill Junction.

KENTUCKY.

* Hamilton Station, 50 3 Elizabethtown.

LOUISIANA.

415 Rayne.

MICHIGAN.

269 New Era.

NEBRASKA.

* Endicott, 50 3 Plattsmouth.

* Reynolds, 45 3 Plattsmouth.

NEW MEXICO.

566 Espanola.

630 Gramma.

NEW YORK.

101 Dalton.

120 Sardinia Junction, P. O. A. care Sardinia.

OHIO.

223 Chester Lake, P. O. A. Elmwood Place.

212 Chicassaw.

241 Ft. Jennings.

221 Freeport.

* Navarre Village, 25 cents by stage, or 50 cents, by special messenger, from Navarre Station.

232 Spencerville.

221 Waterville.

ONTARIO.

* Riverdale Junction.

PENNSYLVANIA.

140 Coalville, Butler Co.

47 Makefield.

47 Neshaing Falls.

84 Potts Grove, Northumberland Co. Check Catawissa.

52 Redington.

QUEBEC.

* Notre Dame du Portage.

* St. Philippe de Nery.

SOUTH CAROLINA.

193 Greers.

TENNESSEE.

245 Riceville.

215 Talbotts.

TEXAS.

* Pittsburg, 50 5 Jefferson.

ATLANTIC CABLE.

The cable between Rio Grande do Sul and Montevideo, South America, is now repaired.

Telegraphic communication with the Transvaal, South Africa, has been restored.

NORVIN GREEN,

President.

Transfer Service.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, Feb. 12, 1881.

To all Transfer Agents and Offices:

On March 1st, 1881, Red Bank, N. J., will be added to the list of Transfer Offices in Class C., and assigned to H. H. Ward's district.

The transfer service has been temporarily discontinued at Glens Falls, N. Y.

NORVIN GREEN,

President.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

New York, February 14, 1881.

The payments for Assessment No. 137, levied January 1st, 1881, and on which membership, if unpaid, lapses March 2, 1881, of members holding certificates of the following numbers, have not yet been received by the Secretary:

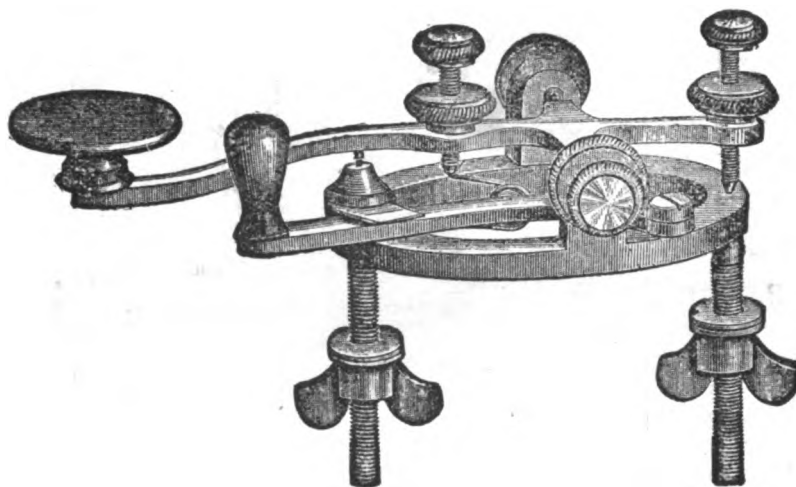
ASSESSMENT No. 137.

6	29	52	61	64	67	93	112	148	184	186	188	189	182	185	186
187	240	245	273	286	294	314	311	344	317	384	412	418	426	455	
483	490	496	503	507	706	8-7	545	564	566	578	597	649	652	697	
705	721	728	729	718	766	769	780	806	813	823	839	870	886	897	
901	923	927	929	942	954	957	959	963	964	979	1046	1071	1085		
10-0	1104	1125	1134	1135	1136	1152	1173	1199	1207	1211	1226	1227			
1284	1267	1-68	1269	1289	1329	1358	1431	1516	1517	1518	1523	1542			
1550	1551	1564	1567	1570	1571	1609	1613	1615	1619	1622	1632	1633			
1657	1670	1673	1676	1710	1712	1717	1718	1729	1735	1759	1760	1765			
1766	1767	1769	1773	1778	1787	1788	1799	1809	1-10	1813	1820	1822			
1894	1915	1916	1917	1946	1947	1964	1969	1991	2-01	2-05	2-08	2-06			
2-05	2-10	2-11	2-15	2-18	2-16	2-15	2-17	2-16	2-17	2-18	2-18	2-19			
2-19	2-20	2-21	2-22	2-23	2-24	2-25	2-26	2-27	2-28	2-29	2-30	2-31			
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5-43	5-44	5-45	5-46	5-47	5-48										

J. H. BUNNELL & CO.'S

NEW STEEL LEVER [SOLID TRUNNION] KEY.

PATENTED FEB. 15, 1881.



BEST IN THE WORLD.

We have much pleasure in being first to make and bring to the notice of Telegraphers and Managers of Telegraphs this new and important improvement in keys.

We offer it as being *more durable* and in every respect *better* than any other for rapid and perfect Morse sending for the following reasons:

The lever is *only one-half the weight* of the ordinary brass lever, as generally made.

The entire Lever and Trunnions together being made of *but one piece* of fine wrought steel, the common defect of loose trunnions is avoided, the strength of a heavy brass lever is obtained with much less weight of metal, and, by the perfect bearing which the solid trunnion gives, together with the use of *hardened platina points*, *sticking is absolutely prevented*.

The size and proportions are such as to make it the most perfect operating key possible to obtain, either for the hand of the skilled and rapid expert or the beginner.

PRICE, \$3.00. FINELY FINISHED, AND LEVER NICKEL-PLATED.

LIBERAL DISCOUNT ON ORDERS FOR COMPANY SUPPLY.

Steel Lever Key sent by mail post paid, to any part of the U. S. or Canada on receipt of the above price, by registered letter or money order.

THE AMERICAN UNION TELEGRAPH CO.

New York, Dec. 18th, 1880.

J. H. BUNNELL & Co.

Gentlemen:—We have in use in this office, sixty-eight of your Steel Lever Keys.

The general verdict regarding them is, that **THEY ARE THE BEST KEYS EVER PUT ON A DESK.**

Yours truly,

WM. J. DEALY,

Manager Am. Union Co.'s (Main Office).

UNION PACIFIC RAILWAY CO. (Telegraph Dep't).

Omaha, Neb., January 15th, 1881.

J. H. BUNNELL & Co.

Dear Sirs:—Your instruments meet with much favor on this company's lines and give good satisfaction. The Steel Lever Keys, especially, are much admired by the operators who generally pronounce them *the best*. They at once combine strength and neatness, and are well adapted for easy and rapid sending.

Yours truly,

L. H. KORTY,

Chief Operator.

CONTINENTAL TELEGRAPH CO.

New York, Dec. 14th, 1880.

J. H. BUNNELL & Co.

There is nothing that I can say that will be too strong in commendation of your New Steel Lever Key. Every one of our operators, without exception, regard it with decided favor, and I am now satisfied that its general use is not only a positive help to operators' efficient labors, but a decided advantage to the general service of the Company. We are using them in preference to all others.

Yours truly,

J. G. CASE,

City Manager Continental Tel. Co.

THE ATLANTIC AND PACIFIC TELEGRAPH CO.

New York, Dec. 16th, 1880.

J. H. BUNNELL & Co.

We have a set of your Patent Steel Lever Keys in use here in the principal office of this Company. They give entire satisfaction in every way. We consider them a great improvement on the old style of telegraph key.

Yours truly,

P. P. HAUFF,

Manager Main Office, 145 Broadway, N. Y.

BALTIMORE AND OHIO RAILROAD CO. (Tel. Dep't).

Baltimore, Dec. 28th, 1880.

J. H. BUNNELL & Co.

Gentlemen:—I take pleasure in forwarding to you the accompanying testimonial, voluntarily contributed by the operators in Camden Station Office, to the superior merits of your New Steel Lever Key.

Very truly yours,

CHAS. A. TINKER, Supt.

BALTIMORE AND OHIO RAILROAD COMPANY.

December 27, 1880.

(Telegraph Department.) We, the undersigned operators at Camden Station, B. and O. R. R., Baltimore, having fully tested your "New Steel Lever Key," concur in saying, it is the best, without any exception, we have ever used.

Respectfully,

CHAS. P. ADAMS,

E. J. LITTLE,

J. W. FERRY,

A. D. FRANK,

W. W. MOORE,

J. F. McLAUGHLIN,

H. F. HILSON.

GEO. R. BUNTING, Jr.

W. E. KING,

B. F. HARD,

GEORGE BOGGS,

WM. A. LENZ,

J. W. STAYLOR,

And I endorse the above, C. W. CLARVOE, Div. Operator.

From the winner of first prize in the first sending tournament, New York, August 22, 1880, 800 words in 11 min. 14½ seconds.

"Cable Station No. Sydney, C. B.," Dec. 26, 1880.

Prefer it to any other key I have ever used. It is the general opinion of the operators here that the Steel Lever Key is the best they have ever seen.

W. J. CURTIS.

"Your Steel Lever Key proves to be one of the best improvements ever introduced in Telegraphic Apparatus."

J. H. LOUNSBURY,

Manager Am. Union Telegraph, Hartford, Conn.

All our best senders who have tried it here, praise it highly and pronounce it "*fast*."

R. J. WYNNE,

W. U. Telegraph, Washington, D. C.

THE FOLLOWING EXPRESSIONS OF OPINION ARE ALL FROM THE WESTERN UNION MAIN OFFICE, 97 BROADWAY, NEW YORK.

We have your keys on the Chicago, St. Louis and Buffalo Quads Western, Eastern and State Press, and C. N. D. Circuits. Without a single exception, the operators regard them as the very best.

FRED CATTIN.

Best key I ever used.

FRANK VITES.

Having worked your Key on Chicago Quad for the past month, can cheerfully say it is the best Telegraph Key I have ever used.

CHAS. F. HUTCHINSON.

Far superior to any other Key.

COURT M. CUNNINGHAM.

Requires less labor, is capable of greater speed, and sends shorter and firmer Morse than any heretofore in use.

J. A. WRIGHT, Jr., D. B. CASE,
RICHMOND SMITH, E. F. HOWELL.

Consider your Key far superior to any I have yet handled.

J. E. SAYRES,
Cincinnati Quad.

Like the Key very much. It makes sending easy.

T. H. ALLEN,
New Orleans Duplex.

Your Key is, without doubt, the best in the world. It is simply perfection.

J. B. COULTER.

Our only desire is to have one of your Keys put on the Pittsburg Quad. Elymiller works on the Pittsburg end.

DENNIS BROWN and M. DUBIVAN.

Your Key is, in my opinion, unequalled.

MINOR M. DAVIS,
Philadelphia Quad.

The finest in the world.

J. B. TALTAVALL, J. H. YOUNG,
St. Louis Quad.

Best I have ever used.

E. H. MILLER,
State Press.

Prefer it to any I have ever used.

CHAS. W. MINIER.

The best Telegraph Key we ever handled.

W. D. CHANDLER, } Chicago Quad.
M. LABAUGH, }

There is but one perfect Key, and this is it.

W. O. ATKINSON,
Baltimore Quad.

FULL LINE OF FIRST-CLASS SOUNDERS, KEYS, RELAYS, AND TELEGRAPHIC EQUIPMENTS OF EVERY DESCRIPTION.
SEND FOR CATALOGUE FREE.

J. H. BUNNELL & CO., 112 Liberty Street, New York.

BISHOP GUTTA PERCHA WORKS.

ESTABLISHED IN 1847.

S. BISHOP, Proprietor.

Manufacture and sell, under Letters Patent No. 65,019,

GUTTA PERCHA INSULATEDSUBMARINE, UNDERGROUND, AERIAL, OFFICE,
Canal, Lead-Covered, Telephone, Torpedo and Hemp Armor
CABLES.**GUTTA PERCHA**Office Wire, Fuse, Leading and Connecting Wires,
for Subaqueous, Mining and all other Electrical Purposes.
MARKS' COMPOUND**INSULATED TELEGRAPH WIRE,**

For OFFICE, outdoor, underground and BATTERY USE

G. P. OFFICE WIRE, Cotton Covered.

ALSO HAVE ALWAYS ON HAND

WIRES OF EVERY VARIETY OF INSULATION,**MAGNET WIRE, TELEPHONE FLEXIBLE CORDS,****FLEXIBLE ELEVATOR CABLES, ELECTRIC CORDAGE,****BURGLAR ALARM & ANNUNCIATOR WIRE,****ELECTRIC LIGHT WIRE, CORDAGE AND CABLES,****LEAD-COVERED WIRE,****AND EVERY DESCRIPTION OF****PURE GUTTA PERCHA GOODS,**

GUTTA PERCHA SHEET, for CABLE SPLICES,

G.P. CHEMICAL VESSELS, for ACID, Etc.

Address all Communications to

W. W. MARKS, Superintendent,

420, 422, 424 and 426 East 25th Street,

OFFICE AT THE WORKS.

NEW YORK

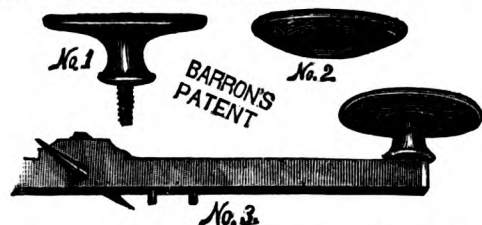
AGENT, L. G. TILLOTSON,

7 Dey Street, New York.

Telegraphers! Save Your Grip!

USE THE FLEXIBLE KEY-KNOB!

It relieves the muscles and is pleasant to the touch. It improves writing, largely overcomes sticking of the key, and facilitates sending. It PREVENTS TELEGRAPHERS' PARALYSIS and enables those who are afflicted with that terrible disease to "send" with but little difficulty.



No. 1 shows a Flexible, Elastic Key-Knob, to be substituted for the present hard-rubber knob; it will fit any key. No. 2 shows an adjustable, elastic cover; it will fit any key-knob. No. 3 shows the adjustable elastic cover fitted to the key-knob. ENDORSERS OF THE FLEXIBLE KEY-KNOB.—Gen'l Anson Stager, A. S. Downer, Thos. Dolan, Thos. A. Edison, W. P. Phillip, E. C. Bollien, C. F. Stewart, T. B. Taltavall, S. S. Schroff, L. B. McCarthy, T. G. Kennedy, J. B. Gaynor, besides many others.

THE FLEXIBLE KEY KNOB AND COVER

Are in constant use on the Associated Press wire and fast Western Union circuits, and are giving universal satisfaction.

The Following Letters Explain Themselves:

New York, May 23, 1878.

A. S. DOWNER, Manager: The Flexible Key-Knob is a GREAT SUCCESS. I never had such easy sending as I have had to-night. Respectfully, H. H. HENRY.

MR. W. J. BARRON: Mr. Henry is one of our most experienced operators, and a person who would not give an opinion like the above unless the article had merit. He sends about 10,000 words per night. Yours, etc., A. S. DOWNER.

New York, May 25, 1878.

A. S. DOWNER, Manager: The Flexible Key-Knob materially improves "light" writing, and it unquestionably renders continuous sending less fatiguing. Very respectfully, FRED. CATLIN.

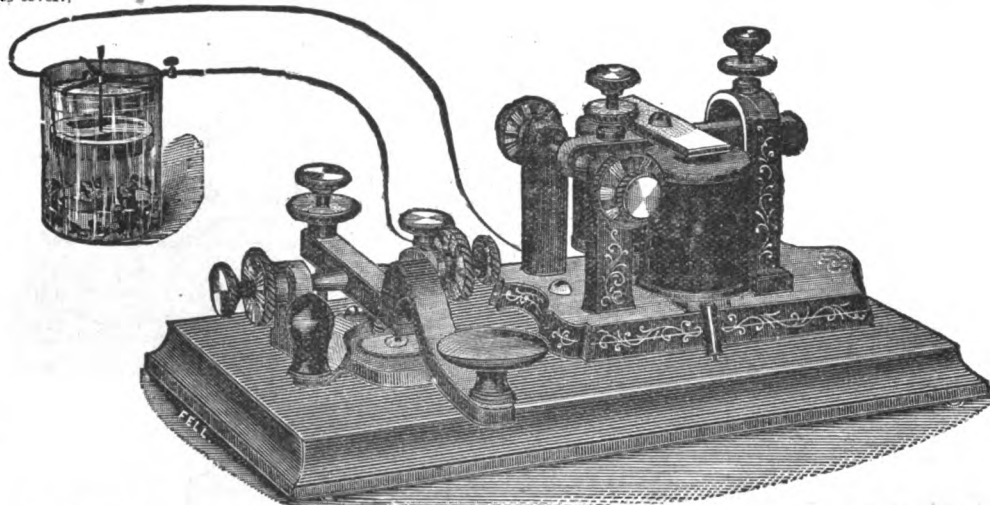
MR. W. J. BARRON: Fred. Catlin is probably as good an operator as this world produces. Yours, etc., A. S. DOWNER.

PRICES: No. 1, 75 cents; No. 2, 50 cents; Canadian orders ten cents additional. Postage stamps taken as cash. Liberal discounts to parties who will introduce and sell.

A. B. SMITH, Agent,

1475 BROADWAY, NEW YORK.

[Through a mistake of the engraver this cut is reversed, the Key on the right of the Sounder, and Circuit on the right of Key-lever.]



The above cut is a true representation of my No. 2 SHERIDAN INSTRUMENT. The Sounder and Key are full-sized Instruments. The base on which they are mounted is 7x4 1/2 inches. The Battery is a regular Main Line Calland Battery 5x7 inches. The Sounder and Key will be furnished separate or on same base, to suit parties buying. The full set consists of 1 Sounder, 1 Key, 1 Cell Battery, Package Vitriol, 15 feet Office Wire, and an Instruction Book.

PRICE OF COMPLETE OUTFIT, \$4.25 No. 2 SOUNDER, ALONE, \$2.50. KEY, ALONE, \$1.25. BATTERY, \$1.00.

These Instruments are well made and nicely finished. The Magnets are full size, and will be wound to work well on from a few feet to five miles of line. They are WARRANTED to be worth the price, and any person buying a set of them who is not satisfied can return them and I will refund the money.

I also have on hand a good stock of Electric Call Bells, Burglar Alarms, Annunciators, Medical Instruments, all kinds of Telegraph Instruments, etc., at very low prices.

In ordering Telegraph instruments please state length of line they are to be used on.

Send for illustrated Catalogue and Price List.

Address,

A. B. LYMAN,

36 SOUTH WATER STREET, CLEVELAND, O.

L. G. TILLOTSON & CO.,

5 & 7 DEY ST., NEW YORK,

Manufacturers and Dealers in

**TELEGRAPH & TELEPHONE
SUPPLIES**

OF EVERY DESCRIPTION.

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FOR

TELEGRAPH LINE MATERIALS, BATTERIES,
INSTRUMENTS AND SUPPLIES.**THE LOWEST PRICES.****THE LARGEST STOCK.****ALL THE LATEST & BEST IMPROVEMENTS
IN INSTRUMENTS, BATTERIES & SUPPLIES.**

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FOR

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LATORS, LECLANCHE BATTERY,

GUTTA PERCHA CABLES,

ETC., ETC.

**THE JOHN A. ROEBLING'S SONS
COMPANY,**

TRENTON, N. J.,

And No. 117 LIBERTY STREET, NEW YORK,

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GALVANIZED TELEGRAPH WIRE,

AND

PLAIN AND OILED WIRE OF SUPERIOR
QUALITY,

FROM SWEDISH CHARCOAL AND B B IRON.

BUT ONE JOINT PER BUNDLE.

POST & COMPANY,

Agents for Cincinnati, Ohio.

EUGENE F. PHILLIPS,

MANUFACTURER OF PATENT FIBERED

INSULATED TELEGRAPH WIRE,

TELEPHONE AND ELECTRIC CORDAGE,

MAGNET WIRE,

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OFFICE AND FACTORY: 67 STEWART STREET,

PROVIDENCE, R. I.

H. SAWYER, Electrician and Sup't.

THE AMERICAN BELL TELEPHONE COMPANY.

W. H. FORBES, *President*, W. K. DRIVER, *Treasurer*,
THEO. N. VAIL, *General Manager*.

This Company, owning the original patents of Alexander Graham Bell for the Electric Speaking Telephone, and other patents covering improvements upon the same, and controlling, except for certain limited territory, under an arrangement with the Western Union Telegraph Company, the Gold and Stock Telegraph Company, the American Speaking Telephone Company and the Harmonic Telephone Company, the patents owned by these companies, is now prepared to furnish, upon application, either directly or through any of its agents, telephones of different styles, and applicable to a variety of uses.

This Company desires to arrange with persons of responsibility for establishing

DISTRICT OR EXCHANGE SYSTEMS

in all unoccupied territory, similar to those now in operation in all the principal cities in this country.

It is also prepared to supply instruments for

PRIVATE LINE and CLUB LINE

systems for business or social uses; also telephones for

SPEAKING TUBE

purposes, for which instruments will be leased for a term of years at a nominal rental.

This Company will arrange for telephone lines between cities and towns where exchange systems already exist, in order to afford facilities for personal communication between subscribers or customers of such systems.

We respectfully invite attention to the foregoing, and any further information relating thereto can be obtained from the Company at

No. 95 MILK STREET,
BOSTON, MASS.

All persons using telephones not licensed by this Company are hereby respectfully notified that they are liable to prosecution, and for damages for infringement, and will be prosecuted accordingly to the full extent of the law.

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KERITE IS INDESTRUCTIBLE.

AFTER YEARS OF THE SEVEREST TESTS IT IS ADMITTED
TO BE THE BEST INSULATOR KNOWN.

IT LASTS FOR YEARS

In earth, air or water, and is recommended and endorsed by all the leading men in the telegraphic profession

THE

DURABLE QUALITIES OF KERITE

RECOMMEND IT AS THE

CHEAPEST AND MOST ECONOMICAL

insulator for all telegraphic purposes.

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of any number of conductors or size of insulation furnished at short notice.

INSULATED WIRE

of all sizes for

OFFICE, LINE OR BATTERY USE

always on hand. Also for sale by all dealers in telegraphic material.

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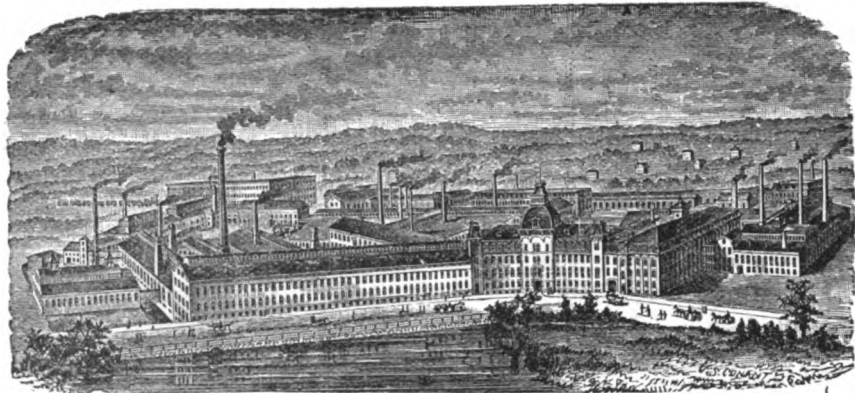
A. G. DAY,
Sole Patentee,
120 BROADWAY, NEW YORK.

C. B. HOTCHKISS, General Agent.

TELEGRAPH WIRE.

WASHBURN & MOEN MANUFACTURING COMPANY.

ESTABLISHED 1861 CAPITAL \$1,500,000.



WORCESTER, MASS.

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This Company having given careful attention to Telegraph Wire from the introduction of the Art of Telegraphy, and especially with reference to the conditions necessary to highest electric conductivity, does not hesitate to recommend this class of its products as unequaled in that particular.

Being the first to

MAKE A SPECIALTY OF TELEGRAPH WIRE,

and anticipating at an early day the great demand that would exist for that article, they have adopted and fully proved certain methods and appliances for the production of Telegraph, as well as of Telephone Wire, which are peculiar to themselves. Among them may be mentioned the

PATENT CONTINUOUS ROLLING MILL,

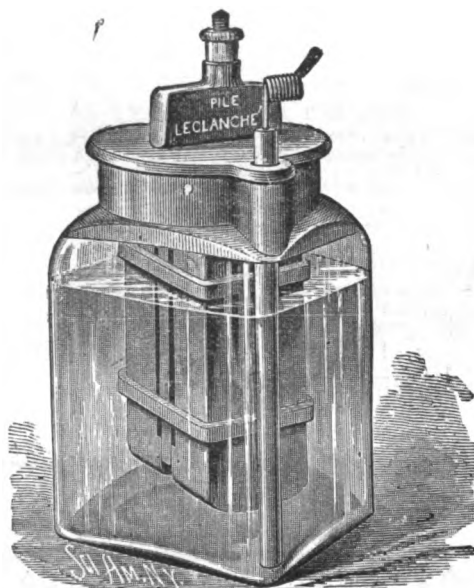
PATENT CONTINUOUS GALVANIZING BATH,

AND THE BELGIAN ROLLING MILL,

(In connection with the DOUBLE ROLLING FURNACE.)

All Wire made by this Company for Telegraph or Telephone purposes is thoroughly tested before shipping, with regard to Conductivity, Tensile and Torsion strength, as well as Elongation. Prices and terms for Telegraph or Telephone Wire, Plain, Oiled or Galvanized, given upon application. N. B.—The qualities known as Extra Best Best (E. B. B.) and Best Best (B. B.), kept constantly in stock.

LECLANCHE BATTERY. (Patented.)



THE GREAT TELEPHONE BATTERY.

THE REALIZATION OF
SIMPLICITY AND EFFICIENCY

IN ELECTRIC OPEN CIRCUIT BATTERIES.

Free from Acid. Emits no Odor. Does not get out of Order. Lasts without renewal from six months to several years, according to use.

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And by all the Telephone Companies and Exchanges in the United States.

The attention of the public is called to the new form of Leclanché Battery, in which the porous cell is dispensed with and for it substituted a pair of compressed Plates or Prisms, which are simply strapped to the Carbon (as shown in cut).

The Prism Battery is more easily and cheaply cleaned and removed than any other battery.

Beware of IMITATIONS and WORTHLESS IMITATIONS.

Every genuine Leclanché Battery has the words Pile Leclanché stamped on the carbon head, jar, and prisms. All others are spurious.

"Prism" and Porous Cell Batteries for sale in any quantity Zinc and Sal Ammoniac of superior quality.

The Leclanché Battery Co.,

40 West 18th St., New York.

Or L. G. TILLOTSON & CO.,

5 & 7 Dev Street, New York.

FOR SALE.

Having purchased part of the
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we offer as follows:
No. 1 Sounders, \$4.00. (Manufacturers' price, \$6.50.)
Patent Peg Out-Outs, with Arrestor and Ground Connection, (extra fine), \$2.00. (Manufacturers' price, \$3.50.)
No. 1 Keys, \$3.00.
These goods are fresh from the shop and guaranteed first-class. Circulars free.

VALENTINE BROS.,
Janesville, Wis.

OPERATORS \$20 TO \$50 WEEKLY.

I will guarantee the above amount to any lady or gentleman having any snap at all. Would like to hear from every Operator in the country. No capital to speak of required. Drop me your address on a postal.

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MANAGER, W. U. TEL. CO.,
Clyde, Wayne Co., N. Y.

ESTABLISHED 1820.

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(SUCCESSOR OF JOSEPH MOORE & SONS)

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AND BURGLAR ALARM WIRE. ELEVATOR CABLES.All wire used is thoroughly tested for conductivity, therefore
ensuring purity and regularity of resistance.

SOLE MANUFACTURERS OF

NICKERSON'S PATENT TIP,

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Descriptive Circulars furnished upon application.

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20,000 Well seasoned No. 1 Cedar Poles.

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With increased facilities in our

SUNDRY DEPARTMENTWe are prepared to give lowest estimates on any article which
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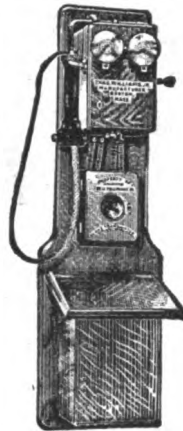
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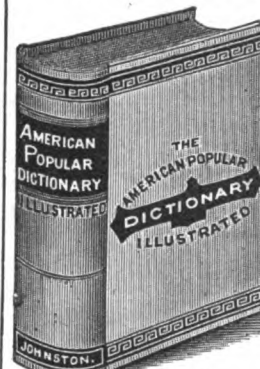
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JOURNAL OF THE TELEGRAPH.

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WHOLE NO. 323.

[From *La Lumière Électrique*.]

THE PROGRESS OF ELECTRIC SCIENCE IN 1880.

By COURT TH. DU MONCEL.

(Second Article.)

From the point of view of purely scientific discoveries, the year 1880 opened and closed on two series of important experiments, which, according to their authors, would open two new fields in physics for exploration. It amounts to nothing less than the discovery of a fourth state of matter, revealed to our senses by extremely curious electrical effects; and on the other hand the transformation of luminous radiations into vibratory movements, that is to say, a mechanical action of light.

We have, in our number of December 1, 1879, reported the experiments of Mr. Crookes on radiant matter, but without insisting on the theoretical conclusions to which these experiments have given rise; nevertheless, these conclusions have been discussed with considerable animosity in the beginning of the year just passed, and all physicists are not yet in accord in regard to them. We will not dwell, therefore, on this question, until the time when it shall be better understood.

We will say the same as to the second, raised by Mr. Bell in consequence of his discovery of the photophone, for there also savants are not in accord, and just now some of them attribute the effects observed to calorific action.

Decidedly, the physicists will not admit of any direct relations between light and material effects; and if it is true that light is only a vibration of the ether, and that the ether is not ponderable matter, they are logical. However electricity and magnetism act on light—and electricity is quite intimately connected with ponderable matter—we are still groping in theoretical speculations. It is, however, certain that the idea of calorific action first presented itself to Mr. Bell, and it was only after certain experiments, whence calorific effects were excluded, that he arrived at his present conclusions. In any case, the advocates of the calorific theory of the photophone cannot call themselves the originators of that hypotheses.

In addition to these new theories, we have also to record those of M. Exner, which have been opposed, each in its turn, by different physicists. M. Exner attempts to explain everything by chemical action, even thermo-electricity; he denies the contact theory in the production of voltaic action, as well as the creation of electro-motive forces of polarization and the purely physical development of electricity in thermo-electric couples. We have enumerated at length the serious objections that could be opposed to his views; and as for thermo-electricity, we have shown some experiments of great interest which throw a new light on the subject.

The fact is, that in the matter of theories we can give a free rein to our imagination, and those which

we accept to-day, will only be true until the time when we shall have found others which shall better account for all the facts; so that in one hundred years time all that we have written to-day may appear as simple as that which was written one hundred years ago appears to us. Meanwhile, let each one add a stone to the edifice, and among these rocks of philosophy we can make a choice to which we will direct the attention of the reader.

For this reason we recall a memoir of M. Planté, printed at the beginning of last year, and which shows that a great analogy exists between electrical phenomena and material phenomena, an analogy that one does not find in considering the effects of light. I have often had occasion to notice that analogy, and it indicates a very intimate connection between electricity and matter; a sort of union between ponderable and imponderable phenomena.

As this connection is of extreme importance, several savants, and latterly Messrs. Ayrton and Perry, have occupied themselves in a special manner with it, and they have found in studying the electrostatic capacity in a vacuum that it diminishes, very little it is true, but in a manner susceptible of being measured (1 per cent. in nearly a perfect vacuum). Messrs. Ayrton and Perry have written an interesting paper on this subject in the name of a scientific English commission, appointed for the purpose by the British Association for the Advancement of Science. The transformation of physical movements into mechanical movements has also been the object of special researches by several savants; we have seen an attempt to explain as a transformation of this nature, by heat, the sounds produced in the photophone; and for a long time the movements of the vanes of radiometers have been attributed to an analogous effect.

Efforts have also been made to produce sounds by direct calorific action, and since 1878, M. Wieselanger has made telephones based on this principle. Last year Mr. Preece made an apparatus which he calls a thermophone, in which he imagines the voice is reproduced by the effect of the dilations and contractions of a platinum wire simply traversed by an undulatory current sufficiently intense. This wire is fixed to a diaphragm and maintained at the other end on a rigid support, and, according to him, the vibratory movements made by this wire and affecting the diaphragm will be the result of unequal developments of heat produced by the undulatory current. M. Wilbrant, of Brussels, and M. Durand, had already obtained this result with weaker currents. If we consider the slowness with which heat is propagated, we can comprehend with difficulty that these variations in length, which result from the heat can cause vibrations; but we are nowadays getting used to abnormal effects, and we have no doubt that this action does take place.

However, if the current causes in the conductors through which it passes a mechanical movement, as several physicists seem to believe, that action could

be thus explained without admitting the intervention of heat. However that may be, several persons and Mr. Preece himself have come away from the experiments we have described, to explain the microphone receiver by calorific effects. Other physicists join to these effects mechanical molecular action, and the question is far from being completely solved. Before the experiments of which we speak, M. Ader had obtained the reproduction of speech with an iron wire, terminated by a metallic mass and traversed by an undulatory current, but he had not obtained it with wires of non-magnetic substances. In order to clearly understand these effects, he searched to find out whether a magnetic iron wire, submitted to the action of an undulatory current, and capable of reproducing speech, suffered elongations and shortenings at the moment of magnetization and demagnetization. Several investigations had been made to this end by other physicists, but they arrived at different results, and M. Ader thought that this disagreement might come from the mechanical and elastic conditions of the wire. He began then a series of experiments in which the wire was submitted to diverse mechanical actions, and he was soon able to recognize that magnetization had for effect to tend to bring back to their condition of molecular equilibrium all wires in which this equilibrium had been disturbed. Consequently, if pressure was exerted on the wire, the magnetization lengthened the wire; if the wire was stretched, one obtained a shortening; if the wire was twisted, an effect of untwisting. He also remarked a curious thing, which was that in addition to the movements resulting from these actions, there was manifested a slow and continual movement which seemed to be due to the calorific action of the current, and which was sometimes in the same direction and sometimes contrary to the first effects produced; therefore, M. Ader doubts that calorific effects can produce movements prompt and sudden enough to cause vibrations capable of engendering sounds. Besides, effects of another sort can produce sounds, and even furnish in certain conditions the reproduction of the voice, and M. Ader has shown that the shock of two or several ends of iron wires in the interior of a helix could engender currents, which, becoming undulatory when one of these ends of wires was fixed on the diaphragm of a telephone, could reproduce speech. He has demonstrated that it was not the displacement of the magnetic core in the helix which determined the action, but rather the shock of the particles, and he has assured himself that the sounds were much stronger when the particles were more numerous in the helix, even when they were each only one millimetre in length. These effects are certainly very interesting.

The theory of the telephone that we set forth at the time of the invention of that instrument, and which has caused so much discussion, is now so well admitted, that several inventors, among others Messrs. Lockwood and E. Russell, have invented

new telephones founded on the principle of molecular vibration; and here we ought to state that, in these words, we have always understood that the vibration is accompanied by a mechanical effect, analogous to that which is produced by pulsations, in a word a *peristaltic movement*. If we step out of the telephonic field to report experiments of another sort, we find among the most interesting works:

1st. A memoir by Mr. Hughes on the effects resulting from the immersion of iron or steel wires in acidulated water, and which have for effect to hydrogenize the iron and render it less susceptible of polarization when it forms the negative electrode of a couple. The hydrogen then disengages itself freely, an action which does not take place with the other metals. On the other hand this metal becomes friable and brittle, but is less easy to oxydize, and becomes more electro-negative.

2nd. A memoir by M. Stroh on the electrical adherence of metals in contact. He shows that this adherence, due to the fusion of the metals at their points of contact, is greater when the metals are poorer conductors, and he concludes thence that circuit-breakers of instruments of precision ought rather to be constructed of silver or copper than of platinum, and above all of hard steel. Under the influence of two bi-chromate cells, the adherence is strong enough to sustain 225 grammes with the latter metal, and 42 with platina, whilst with silver and copper it sustains only .15 grammes.

3rd. A memoir by Mr. Preece, in which he shows that copper wires, in certain conditions of size, can have their conductivity altered by the passage of a strong current in such a way that a wire which has not yet been used would be sometimes a better conductor than a wire which had previously been used.

4th. A memoir by Mr. Siemens on the conductivity of carbon, which, according to him, would augment in the proportion of 0.000,331 per degree, centigrade, and he shows that if other experimenters have arrived at contrary results, it is because they have not eliminated the causes of perturbation.

5th. A memoir by M. Piazzoli on the influence of magnetism on the tenacity of iron, from whence it would result that magnetized iron would be the most tenacious.

6th. A memoir by M. Fernet, in which he studied the manner in which the induction spark is propagated in a vacuum made at different pressures, and sufficient for the two currents, inverse and direct, to pass successively. He shows, first, that for a vacuum of five to six millimetres, the light is at first continuous, then becomes intermittent, and that the luminous points move successively toward the positive pole; second, for a vacuum of one to two millimetres, the intermittent character of the light appears from the first instant, but that the luminous points, after being displaced in the manner indicated above, seemed to go back toward the negative pole, but at unequal intervals of time, and as much longer as they are more distant from this pole; third, that at a pressure of one-half millimetre, at the moment when the stratifications appear, the same effects are produced, but the intermittent character of the light is more pronounced, and the displacement of the luminous points, which is produced equally in both directions, but in a manner much less sudden, manifests itself then in an inverse direction.

7th. A memoir by Mr. Siemens on the influence of the electric light on vegetation, in which he shows that the electric light is efficacious for producing chlorophyll in the leaves of plants, and for advancing their growth, and that, according to the effects observed, one can admit that plants have no need of a period of repose from luminous effects to

develop themselves properly. He has besides discovered that an increase of heat communicated to a plant exposed to the action of the electric light does not tend to enfeeble it.

8th. A memoir by M. Ader on telephonic transmission in open circuits, in which he shows that these induced currents, produced by a microphone acting on the primary circuit of an induction coil, with one cell of Leclanché, can transmit speech in a telephone by the use of only one of the two wires communicating with the secondary coil of the helix; but that these sounds are stronger when a certain length of wire is connected to the other wire of the secondary helix; and better yet when this additional wire is attached to one of the sides of a condenser; and best of all when the other side of that condenser is attached to the other wire.

9th. A memoir of M. Cabanellas on the increase of resistance in the induction helix in induction machines by consequence of its movement. This increase, already pointed out by Messrs. Jamin and Le Roux, has been studied under very favorable circumstances by M. Cabanellas, and he has been able to demonstrate that it could increase 25 per cent. in the ring of an ordinary Gramme machine running at 450 revolutions per minute, and that it was not at all modified by metallic resistances interposed in the circuit, or by increase of the electromotive force of the generator employed for these experiments. He intends to study later the variation of these increments with the speed of rotation of the ring.

10th. A memoir by M. Pellat on the electromotive forces of contacts, from whence it would result that these electromotive forces vary with the physical states of the metallic surfaces and the physical conditions of the film of air interposed, and that the metals became generally more positive when heated. Pressure, and the nature of the gas interposed, would also exercise a certain influence.

To complete this summing up we must mention also the experiments of M. Bouty, on the determination of the electro-motive forces of thermo-electric currents resulting from the contact of a liquid with a metal, and on the phenomenon of Pettier; the experiments of M. Righi on magnetism and electric discharges in the vacuum; those of M. Coulon on the duration of induced currents; the very important experiments of Messrs. Hautefeuille & Chappin, on the transformation of oxygen into ozone by the electric effluvia, and on the physical effects of the electric effluvia; the experiments of Messrs. J. and P. Curie on the development by pressure of polar electricity in hemihedral crystals with inclined fascies; the experiments of M. Lescuyer on the alternate inversion of direction of movement of a magneto-electric machine, submitted to the action of the current of a dynamo-electric machine; the experiments of Mr. Blyth, on the currents produced by the friction of metals; the experiments of M. Mascart on atmospheric electricity and the theory of induced currents; the experiments of M. Villari on the thermic laws of electric sparks produced by discharges of condensers; the experiments of M. Gernez on the influence of electricity on evaporation; the experiments of Messrs. Elphinston and Vincent on magnetism, which demonstrate conformably with the results of numerous works that I had undertaken since 1856, on that subject, that the force with which an armature is held against an electro-magnet after the interruption of the magnetizing current, augments with time, and can become considerable; and lastly, the experiments of M. Bach on the magnetism of a wire traversed by a current; and those of M. Hirn on the measurement of quantities of electricity, etc., etc.

We should have many other undertakings still to notice if we entered into the detail of the electrical instruments which have been invented during the year 1880, but outside of instruments for electric and photometric measurement, there are none of sufficient importance to necessitate any special study. We will only mention the tourniquet of M. Lontin, which, under a new form, puts in relief certain well-known mechanical reactions of the current, but which shows no new effect, as some persons have stated. We will note finally, certain researches on selenium made by Messrs. Graham Bell and Blodet, who have arrived; the first, to render it infinitely more sensitive to the effects of light, by preparing it in a certain special manner, and the other to cause it to produce electric currents of a very peculiar nature, and very difficult of explanation. It is well known that some years ago Mr. Siemens had constructed with this substance a photometre of sufficient sensitiveness.

We would yet maintain certain phenomena of magnetic attraction observed by M. Ader, in exposing to the action of magnet the pith of elder, paper and other light bodies. These effects have astonished many persons who have seen them, but it requires a certain adjustment of the magnet to obtain these attractions, and when one does not adopt the necessary arrangements, the experiments do not succeed; it is doubtless through this cause that M. Piazzoli has failed. He has stated it is true, that the elder pith used by M. Ader had been cut with a knife, and he showed that an infinitely small quantity of iron, even in the state of a salt, would suffice to furnish the attractions in question (which are then only attractions between magnetic bodies); nevertheless M. Ader assures us that he has obtained the effects pointed out by him, with the pith of elder prepared with ivory knives. Besides, these phenomena have been observed by a great number of physicists. As may be seen, the year 1880 has brought to electric science many acquisitions, and judging from the studies undertaken for 1881 we expect the latter will bring still more. The science of electricity is still, as it has been described a long while ago, a science of surprises and magic.

Telegraphic Transmission of Pictures of Natural Objects.

At a meeting of the Physical Society, held in London, February 26th, Mr. Shelford Bidwell read a paper on the "Telegraphic Transmission of Pictures of Natural Objects." The process is explained as follows:—The positive pole of a battery is connected through a set of resistance-coils to a piece of platinum wire, and the negative pole to a plate of zinc, upon which is placed a sheet of paper moistened with a solution of potassium iodide. The negative pole of a second battery is connected through a selenium cell with the same platinum wire and the positive pole to a zinc plate. The point of the platinum wire is pressed upon the paper, and the selenium being exposed to a strong light, the variable resistance is so adjusted that the currents from the two batteries, which pass through the paper in opposite directions, exactly neutralize each other. The platinum point will now make no mark when drawn over the paper, but if the selenium is shaded its resistance is immediately increased: the current from the first battery then predominates, and the path of the platinum point across the paper is marked by a brown line, due to the vibration of iodine. The line is fainter the feebler the light is. This arrangement has been applied by Mr. Bidwell in his "Telephotograph" exhibited to the meeting. The transmitter consists of a brass cylinder mounted on

a screw spindle, which carries the cylinder laterally 1-64 of an inch at each revolution. A pin hole in the middle of the cylinder allows light to fall upon a selenium cell placed behind it within the hollow cylinder. The cell is connected in circuit with the battery and the line. The receiver consists of a similar metal cylinder, mounted so as to rotate synchronously with the first, and having a platinum point pressing upon a sheet of chemical paper wrapped around the cylinder. This receiver and transmitter are connected up as described above, with two batteries and a set of resistance coils. The image to be transmitted is focussed upon the cylinder of the transmitter, and the resistance adjusted, and the receiving cylinder covered with sensitized paper. The two cylinders are caused to rotate synchronously, the pin hole in the course of its spiral path covering every point of the focussed picture. The amount of light falling upon the selenium will be proportional to the illumination of that particular spot of the projected image which is for the time being occupied by the pin hole, and the intensity of the line traced by the platinum point in the receiver will vary in the same proportion. These variations will produce a picture which, if the instrument were perfect, would be a counterpart of that projected upon the transmitter. Simple designs cut of tin-foil and projected by a line have been successfully transmitted. With selenium and paper of greater sensitiveness more perfect results might undoubtedly be obtained.

Professors Ayrton and Perry showed an experiment illustrating their plan for sending light and shade images by electricity. A selenium cell was connected in circuit with a battery and a coil of wire surrounding a tube along which a beam of light passed. A shutter having a small magnet attached was suspended in the tube like a galvanometer mirror, so that when a current traversed the coils the shutter was deflected so as to close, or partially close, the tube and shut off the beam of light. It will be understood that when a ray of light fell in the cell, and diminished the resistance, the current in the coils would increase to a degree proportional to the intensity of the ray, and thus the shutter would proportionally cut off the light in the receiver. If, now, a number of these elementary circuits were combined so as to provide a mosaic of cells to transmit the reflected image of an object, and a screen to receive the corresponding beams of light controlled by the shutters at the other end of the line, there would be a means of sending light and shade images by wire. A rapidly rotating arm, carrying a row of cells upon it, might answer for a stationary mosaic transmitter and need fewer cells, while a Japanese mirror, having its curvature altered by electromagnets behind, might be made to act as a receiver, the "magic" images of that mirror being due to inequalities of the surface.—*The (London) Chemical News.*

Electric Locomotive Headlights.

THE Westinghouse Air Brake Company are experimenting upon plans for substituting electric lights in locomotive headlights in place of oil lamps. Should they prove successful, it will be almost as profitable an invention and as great an improvement as the air brakes. There is little difficulty in supplying electricity by machinery operated by the running of the locomotive itself, but the desideratum is to get up some machinery which will keep in operation when the locomotive stops, as otherwise the current of electricity will be broken, and the light will go out. In order to do this it looks as if an engine will have to be built upon the locomotive

separate and distinct from the other machinery. The difficulties in the way will be overcome eventually, and the electric headlight become a fixed fact.

Correspondence.

COMMUNICATIONS intended for publication must, to receive attention, be accompanied by the name and address of the writer, not necessarily for publication, but for the information of the Editor, and as a guarantee of good faith.

PROTECTION OF OIL TANKS FROM LIGHTNING.

To the Editor of the Journal of the Telegraph:

IF not trespassing too much on your space, permit me to reply to Mr. I. N. Miller's second communication on the subject of protecting oil tanks from lightning, which appeared in the issue of April 1st. It seems that I was not far wrong in my conclusion that Mr. Miller's investigation to discover why oil tanks cannot be protected by the use of rods was not thorough, for he admits in his second article that he did not see any rods in that part of the country he visited applied to oil tanks, these rods being in bad repute there, etc. I think he has also considerably modified his opinion, i. e.: "That rods are useless upon oil tanks, even when constructed on scientific principles and under the most favorable circumstances," when he says in the second communication: "If this limit is determined (meaning the height to which rising gas is ignitable), and it is practicable to extend the rods beyond it, they will act as a protection; otherwise, I think they will not." And again: "If it is true that this gas is heavier than air, then I see no good reason why rods when properly constructed should not be effective." I hold to the opinion, and think I can give a good reason for it, that the gas is not ignitable except close down around the tanks. I have been informed by men of experience in the oil business that this gas seeks the ground, being heavier than air, and on that account often gets into the furnaces and causes terrible explosions.

Mr. Miller raises the question: "How far above the tanks does the gas ascend in sufficient quantities to be ignitable?" This is an important and serious question, but I think it can be determined without recourse to any dangerous experiments; at least I have no ambition in that direction, unless on a small scale. I find that if we turn on the gas jet in the house, and hold a lighted match a foot or so above the burner, although the escaping gas blows the flame nearly out, the gas does not ignite, it being too freely mixed with air at that distance to be ignitable unless more closely confined. On the same principle the rising gas from an oil tank (if it rises to any considerable height) has the atmosphere of all out doors to mix with, and will not be ignitable for the same reason. Where oil tanks have iron tops which are comparatively tight, the gas must necessarily escape slowly, and consequently will mix with the air soon after leaving the tank, and its explosive nature be destroyed. On this account, I should say the gas would not be ignitable six feet at the most above the top of the tanks. Where tanks have no tops and the gas is allowed to escape in volume, then, no doubt, it will be ignitable at a higher distance.

Another point: After the first gust of wind and rain which generally precedes a thunder storm, what becomes of our much-talked-of column of gas? Of course it is quickly dispelled, even though the wind is but a slight breeze, and when the lightning appears, the air must be tolerably

clear. Of course if there is but one case in a thousand where lightning precedes wind and rain, we should provide for it, but it must be admitted that such instances rarely, if ever, occur. We first have the breeze, then the rain, then comes the lightning. The large number of tanks fired by lightning last summer could not have been due to the current following a column of gas to every tank, for reasons above stated. I believe that the destruction of most of those tanks was due to the discharge falling directly upon the surface of the tanks, thereby causing numerous sparks and the ignition of the gas. Had they been provided with properly constructed conductors, there would have been no discharge upon the tank, as the current would have been silently carried off through the points of the rod to the earth. Those tanks that were fired, which had conductors on them, must have had conductors improperly applied or constructed upon false principles.

In conclusion permit me to say that after Mr. Miller has considered these points, I believe he will take another step and agree with me in the opinion that equipping oil tanks with a system of conductors based on scientific principles will afford protection.

A. A. KNUDSON.

Economical Arrangement of the Callaud Battery.

GREEN BROOK, N. J., March 29.

To the Editor of the Journal of the Telegraph:

I HAVE noticed several communications in the JOURNAL OF THE TELEGRAPH at various times in regard to the economical arrangement of batteries, particularly in the number of March 1st, 1879, which speaks of Mr. W. H. Preece, the distinguished English Electrician, having, when in this country, condemned the Callaud battery. I have worked a Callaud battery over a year without adjusting the sounder, or adding sulphate of copper, or removing any of the zinc solution.

My method of setting up a Callaud battery is as follows:—Place the copper in the bottom of the jar, put in sulphate of copper to the top of the copper, suspend the zinc, and pour in water to within a quarter of an inch of the top of the jar. To supply the loss from evaporation it is necessary to add water every three weeks, and this will also prevent the zinc solution becoming too strong, which is the cause of the unequal working of the batteries.

This method of arranging the Callaud battery is perfectly reliable, and is also the most economical, as coppers can be used five years and more, and the zinc will last two years, while the jar will be perfectly clean. Operators who have tried the plan of wrapping the zinc in paper, mentioned in the same number of your paper, concede the decided superiority of my arrangement, both as regards economy and trouble.

J. T. E.

Adjustment of Lightning Arresters and Ground Wires.

SHELBYVILLE, IND., April 7.

To the Editor of the Journal of the Telegraph:

PLEASE answer the following.

1. How far should the points be from the plate on a lightning arrester on a plug switch?
2. Should the ground wire, when attached to a gas pipe, be soldered?

J. N. C.

[ANSWER 1.—The points should be adjusted as near the plate as is possible without establishing a connection.

2.—Yes.]

Journal of the Telegraph.

PUBLISHED SEMI-MONTHLY AT 195 BROADWAY.

J. N. ASHLEY,

EDITOR.

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NEW YORK, APRIL 16, 1881.

Direct United States Cable Business.

REFERRING to the notice in the last number of the JOURNAL OF THE TELEGRAPH, messages to be forwarded by the Direct United States Cable Company should in future be addressed to "Direct, New York." The address "Ward, New York," should not be used.

THOS. T. ECKERT, General Manager.

THE CONDITIONS OF A SATISFACTORY TELEGRAPH SERVICE.

THE conditions of a satisfactory telegraphic service are tersely expressed in the motto adopted by the House Telegraph Companies, when that system was actively competing with the Morse and Bain—*prompt, accurate and reliable*. At that time the service generally was not by any means thus characterized, and under the conditions then existing it was impossible that it should be so. Since then, however, there has been a continual and material improvement in these respects, and what was then considered a fair and reasonable performance of telegraphic work, would now be considered by the public very inefficient and unsatisfactory.

Intelligent managers of telegraph systems early realized the necessity of imparting to the service the characteristics which would make it of the greatest possible value to its patrons. The first of these is promptness of transmission and delivery. Under the division of the lines, at the time referred to, into independent sections each covering a comparatively small extent of territory, and under divided and frequently inharmonious management and operation, this was impossible. The frequent repetitions of messages which under such a system were unavoidable, not only caused delay, but also greatly increased the chances for and probability of inaccu-

racies in the messages as finally delivered; and at the same time the responsibility therefor was so divided as to make it difficult to locate it. Obviously the first thing to be done was to consolidate the service into a comprehensive system, substantially covering the whole country under one management and control. This consolidation was inevitable; and that it has been successfully accomplished against the obstacles and opposition, not only of the interests unfavorably affected thereby, but of the press and of the public, who failed to appreciate the necessity therefor or the benefits to be derived therefrom, demonstrates the wisdom in which it originated. It is not too much to say that it is to these consolidations that we are indebted for a telegraphic system in this country certainly not inferior to that of any other country in the world. From the Atlantic to the Pacific a message can now be sent ordinarily with the assurance of its speedy transmission and delivery. This promptness of transmission has also been facilitated by the invention and adoption of improvements, which have largely increased the amount of business which can be transmitted over the wires within a given time, the expense of which it has been possible and profitable to incur through the concentration of the capital and business.

It should also be remembered that while these improvements have been made, the cost to the public has been constantly reduced until now the aggregate is but about one-third of that necessarily imposed for the previous divided and comparatively unsatisfactory service rendered.

Accuracy is also an indispensable element of a useful and satisfactory telegraphic service. Any one who has been familiar with telegraphy during the last quarter of a century will recognize the great improvement which has taken place in this respect.

Promptness and accuracy insure reliability, and a telegraphic system and service is thus provided which will meet the requirements and necessities of the public. Material as has been the progress already made, the work will and must still go on. What has been accomplished is an encouragement to continue in the good work. Improvements in apparatus and in the methods of operation are constantly being developed, and the accumulated and the accumulating experience of those engaged in the service all tend to increase the perfection, reliability and economy of telegraphic communication.

The Telephone Exchange Association.—Adjourned Meeting at Chicago, Ills.

At the Convention held at Niagara Falls, in September last, a Telephone Exchange Association was organized, and committees appointed to investigate various subjects of interest and importance in connection with the establishment and operation of telephone exchanges and circuits, to report at an adjourned meeting in Chicago, Ills., on April 12th. The adjourned meeting took place at the time designated, and continued in session for two days, which were profitably occupied in hearing the reports of

committees, and in discussions upon the important topics presented for consideration. The telephone interests of the country were well represented, and there was general and intelligent participation in the discussions by those present. We give elsewhere a pretty full report of the proceedings, and the importance of the telephone interests of the country will warrant the space occupied, and we have no doubt but that it will be read with general interest.

We have not space to comment upon the several subjects which came up for consideration, among the most important of which were those of charges to customers, and the size and character of wire which could be profitably used for telephone lines.

It is becoming evident that a change must be made in the system of charging for telephone exchange service. It has been customary to make an annual charge for the use of the facilities furnished to customers, which covered everything. This is unjust to the patrons and unprofitable to the exchanges. A patron who uses his line perhaps not more than two or three times per day is required to pay as much as his neighbor, who may use it fifty times a day. Besides, customers allow their friends and even strangers to make use of their telephone facilities, adding to the labor and expense of the exchanges, for which no revenue is received. A much fairer system, and one to which we think all exchanges must come, is to charge a less annual rental and a certain small fee for each connection made. This system has been introduced in Boston and San Francisco and, we think, by one or two other exchanges, and although there was some dissatisfaction expressed at first this has subsided, and the justice and propriety of the new arrangement is generally acknowledged by their patrons. Under the system adopted at other exchanges some customers probably pay more and others less than they should for the accommodation afforded them, but the exchange is the greatest sufferer thereby.

In regard to wire there was considerable difference of opinion, though experience seemed to indicate that for lines of not more than a mile in length a small steel wire was preferable, as giving greater strength with less weight of material. For longer lines the additional resistance of steel wire renders their use inadvisable.

The Convention adjourned to meet in Syracuse, in September next. The delegates speak very highly of the courtesy and attention shown them by the telephone companies and the telephone managers and employes of Chicago, by whom nothing was left undone to make their visit satisfactory and enjoyable.

The New York Electrical Society in its New Quarters.

THE New York Electrical Society may now be regarded as fairly and prosperously inaugurated, and with a future before it of constantly increasing usefulness. Through the kindness of the managers of the Cooper Union a lecture room is provided for its meetings, admirably adapted to the purpose, and at

the cost only of the lighting and services of the janitor, no rent being charged therefor.

A goodly number of the members assembled Thursday evening, the 7th inst., to inaugurate the series of meetings to be held under the auspices of the Society. General approbation was expressed of the room in which the meeting was held (the Chemical Lecture Room in the Cooper Institute), and the audience were in a happy frame of mind to listen to Mr. Geo. B. Scott's explanation and demonstration of the subject selected for the evening's instruction, "Electric Measurement by the Wheatstone Bridge." The lecturer was perfectly familiar with his subject, and succeeded in making the principles and operation of the Bridge so clear and plain that the most obtuse auditor present could not fail to understand them.

The membership of the Society is rapidly increasing, as is also the interest exhibited in it by its members generally.

The next meeting will be held at the same place Thursday evening, the 21st inst.

BUSINESS NOTICES.

THE Flexible Key Knob is fast coming into use. Greater speed is attained with less exertion or strain. Many good operators, who have been either partially or entirely laid by, because of telegraphers' paralysis, are, with this key knob, able to do duty. Saves tons of medicine and time. See advertisement on last page.

Literature.

How we Fed the Baby, to make her healthy and happy; with health hints. By C. E. Page, M.D. 144 pages. Paper. 50 cents; cloth, 75 cents. New York: FOWLER & WELLS, 753 Broadway.

THIS treatise heralds a new departure in the alimentation of infants, and gives every evidence of conscientious and intelligent study on the part of an author of broad experience, familiar with all the details of the nursery. The central feature of the work represents the infancy of the author's own daughter, whose first months were happily made free from the common inconveniences, not to say horrors, popularly supposed to be unavoidably connected with this period of life. Our author makes plain how infantile diseases may, in great measure, be avoided, and infant life made as free and joyous as that of the most fortunate among the lower animals. Physicians will know how to prize the work of a specialist in this particular branch of medicine.

The Telegraph.

PAYMENT OF THE WESTERN UNION DIVIDEND TEMPORARILY POSTPONED.

On the 15th of March, an order of the Superior Court of the City of New York was issued, temporarily restraining the payment of the dividends on Western Union stock and certificates, declared under resolutions of the Board passed March 9th. This injunction is likely to be but temporary, its removal being daily expected, but in view of the facts the following action was taken by the Board at a meeting held on Thursday, April 14th:

Whereas, The order of the Superior Court of the City of New York, granted March 15th, restrained this Company from the payment of dividends under

the resolution passed by this Board on the 9th of March, and the dividend cannot be paid on the 15th of April, as declared; therefore,

Resolved, That the payment of cash dividend, declared by this Board on the 9th of March last, be, and is postponed to such date as may hereafter be fixed by this Board, or by the Executive Committee.

Western Union Telegraph Company.—Resignation and Appointment of Directors.

At a meeting of the directors of the Western Union Telegraph Company, held Saturday, April 2, the resignation of Mr. Cornelius Vanderbilt as a director of the Company was received and accepted, but no successor was elected. There are now two vacancies in the board.

General Thos. T. Eckert, was elected a member of the Executive Committee in place of Mr. Samuel F. Barger, recently resigned.

The Block Island Cable Repaired.

LIEUTENANTS SWIFT and Berkhimer, of the United States Signal Service, succeeded in repairing the break in the Block Island cable on the 8th inst., and communication with the mainland is restored. The fault in the cable was found two miles from the island.

The South American Cable.

A DESPATCH from Vera Cruz, Mexico, dated April 5th, states that the cable steamship *Dacia* has successfully laid the first section of the Central and South American telegraph cable southward. The cable surveying steamer *Hornet* was at Acapulco, having taken very satisfactory soundings for the cable from Callao to Tehuantepec. The Central and South American Telegraph Company has secured all the necessary rights, and will connect with the West Coast of America Telegraph Company at Callao, establishing cable communication with Valparaiso, Chili.

Dissatisfaction in the British Government Telegraph Service.

It seems that a government telegraph system is not a panacea for discontent of the employés with the conditions of the service. *The Electrician* states that numerous meetings of the British postal telegraph employés have been held all over the country since the interview with the postmaster-general, at which the speakers have complained of unfair treatment, in that they were confronted with their superiors, before whom they did not dare to speak out. In the event of the answer of the postmaster-general being unfavorable, it has been resolved to hold a conference to decide on the course to be adopted. There can be no doubt as to the unanimity of the clerks, says *The Electrician*, and we sincerely hope that anything approaching to a strike may be averted, and that the matter may yet be settled by a common sense talk between all parties. Mr. Fawcett deprecates haste, and again declares the subject is receiving his fullest consideration.

The British Gower-Bell Telephone Company.

THE prospectus is issued of this company, formed with a capital of £600,000 in £1 shares, to purchase and work the patent of the Gower-Bell Loud Speaking Telephone, which has been officially adopted by the Postmaster-General. Contracts have been made by the Government for 5,000 of these telephones, and the right is reserved to call for 15,000 more to be delivered by December, 1883. This telephone is also extensively used in France and in the British Colonies. It is proposed to establish telephone

exchanges and to form private lines where required. No estimate is given of probable profits, but it is stated that the United States Company pays dividends at the rate of 28 per cent. on the paid-up capital. The price to be paid for the various patents in the United Kingdom is £200,000, of which the vendors agree to take £100,000 in fully paid-up shares.

Consolidation of Telephonic Interests.

A Boston paper states that mutually satisfactory arrangements have been made for consolidating the European interests of the Continental Telephone Company and the Edison Telephone Company. A new company, to be known as the European Telephone Company (limited), with a capital of £800,000, has been agreed upon, with headquarters to be located at London, Eng., and which will merge the interests of the Continental and Edison companies in Europe. In order that the reader may understand the arrangement, a few words of explanation are offered. The Continental Telephone Company was incorporated under the laws of Massachusetts "for the purpose of manufacturing, selling, or renting electric telephones and telephonic apparatus, and to establish, build and maintain lines for the transmission of messages by electricity or otherwise in any country or countries other than the United States of America." Having located in Boston and duly organized, the company purchased the right to use the telephonic inventions of Prof. Alexander Graham Bell, and also other important patents for transmitters, and various devices in telephony for the countries of Russia, Italy, Spain, Portugal, Central and South America, and the West India Islands. Concessions were obtained from the several European countries named, as well as from the various Central and South American States, and from the West Indies, and work was actively prosecuted. In consequence of the energetic efforts made, the stock of the company rose to a considerable figure above par, and has continued to show steady improvement in value. The capital of the company is \$300,000, 3,000 shares of a par value of \$100 each. The Edison people had a large number of concessions in European countries, besides certain privileges in those countries which the Continental folks considered their own especial field. Cessation of competition between the two companies was deemed desirable; hence a "consolidation." Papers were signed about two weeks ago. By the terms of the agreement, the Continental company surrenders all its concessions and privileges in Russia, Italy, Spain and Portugal, also selling the right to use Bell's telephone and improvements, and Blake's transmitter and improvements in the countries named, to the new company (the European), receiving in consideration therefor a sum in cash and stock of the new company—in about the ratio of one-third of the former to two-thirds of the latter—aggregating about \$700,000. The transaction does not include the transfer of about a dozen other important telephonic inventions in the possession or under the control of the Continental Company, nor does it interfere in any way with the operations of the company outside of Europe. The Edison Company takes out a slightly larger proportion of the new stock, or its equivalent than does the Continental, when both companies have been settled with, about \$1,500,000, of the \$3,000,000 (£800,000), capital of the European company, remaining as working capital."

Automatic Recording of Telephone Messages.

In a book on the application of the telephone and microphone to physiological and chemical uses, Dr. Boudet describes his method of automatic recording

of telephone messages. To do this he removes the diaphragm of the Bell telephone, screws to the wood one end of a steel spring, the other end being opposite the pole of the magnet. To the free end he solders a small piece of soft iron, weighing one-tenth of a gramme. Attached to this piece, and in the prolongation of the axis of the spring, he fixes a light bamboo arm, ten centimetres long, and terminated by a needle of whalebone. In fact, the diaphragm is replaced by a movable armature resembling the interrupter of an induction coil. The tracings are made on smoked paper, and transferred to glass. There are some points of difference, as well as resemblance, which make it probable that tracings of this kind may be deciphered, but the matter is in embryo yet.

Support for Telephone and Telegraph Lines.

MR. T. G. ELLSWORTH, manager of the John street office of the Metropolitan Telephone and Telegraph Company, New York City, has devised a system of supporting telephone and telegraph wires, which combines many novel features. It is intended to take the place of, and obviate the necessity for, the great number of poles and fixtures now used, and to economize the great expense and trouble now incurred in maintaining their poles and fixtures in the streets and upon the house tops.

Mr. Ellsworth proposes to erect along the streets tubes, which may be of any desired form, and may be made ornamental, and which shall be supported by light and handsome iron columns along the edge of the sidewalk. Inside the tube are arranged a number of shelves for supporting the cables, which are marked at suitable distances along the route in the covering. At each street crossing is located an electric light, its support being a part of the structure. At proper distances are located letter boxes arranged for the attachment of a pneumatic tube for collecting the letters, or they may be collected in the usual way by carriers. Electric clocks are located at desired points. Police time detectors form a part of this system, each policeman to signal to station while on his beat. By this arrangement it may be known where the men are at stated times. Fire-alarm boxes are placed at suitable distances, and ambulance boxes are provided for calling ambulances. Drinking fountains are distributed at different points. These attachments constitute some of the uses which can be made of the structure. The columns being hollow, admit of cables passing unseen underground, to offices wherever desired, or special tubes can be arranged for conveyance above ground.

Brooks' System of Insulation.

WE hear that Mr. Brooks' system has been tried with great success between Waterloo and Nine Elms Station, on the London and South Western Railway, with 30 wires in a tube, for one year. Encouraged by this success, the government is about to extend the system from Nine Elms to Queen's-road Station, with 30 wires in a tube, and from Queen's-road to Olapham with 40 wires in a tube.—*The Electrician*.

Foreign Telegraphic Notes.

THE telegraphic match between the Liverpool Chess Club and Calcutta has been concluded in favor of the former. It has occupied a little over four months.

The Mexican Gulf Steamship Company has established a telephonic line between San Andres Tuxtla, and San Tecomapam, Mexico.

M. Ader has just been awarded 3,000 francs by

the Paris Academy of Sciences for his advances in Phonetic Telegraphy, as also Telephony.

Efforts are being made to establish telephonic communication in London, between the Houses of Parliament and the clubs and private houses of members.

It is proposed to lay a cable between the island of Sakhaline and the mainland of Western Siberia, a distance of about 63½ nautical miles. This island is a large Russian penitentiary, and, with the exception of four months in the summer, is cut off from the mainland, the only means of communication being by sledges.

The underground telegraph wires being laid in France between Paris and Nancy are placed in an iron tube, accessible by means of doors at every 500 metres distance. In this way the necessity for breaking up the ground to get at the wires is obviated.

The Electrician says that it understands that an agreement has been arrived at between the Post Office and the Telephone Companies in England, on the basis of the payment of 10 per cent. of the receipts of the companies as Royalty to the Postmaster-General.

At noon on Tuesday, March 15th, the Postmaster-General, with whom was the first and second Secretaries of the Post Office, and a number of divisional surveyors, received a deputation of delegates, representing the telegraph clerks of the United Kingdom, to give them an opportunity of setting forth their grievances. The interview, which was private, lasted upwards of six hours. We understand that the result is deemed in the highest degree unsatisfactory by the clerks.

THE largest span of telegraph wire in the world is stretched across the Kistnah River, from hill to hill, each hill being 1,200 feet high, between Bezorah and Sectanagum, in India. The span is a little over 6,000 feet in length. The only mechanical contrivance used in stretching this cable across the river was a common windlass.

Miscellaneous.

THE NATIONAL TELEPHONE EXCHANGE ASSOCIATION.

Adjourned Meeting at Chicago, Ill.—Important Topics Discussed.

THE adjourned meeting of the National Telephone Exchange Association convened at Chicago, Ill., April 5th, and continued in session for two days. The meeting was well attended, and much profitable work was done. The outcome of this meeting differs somewhat from that held at Niagara Falls in September last, in that there was a more general participation in the discussions, and these were not so largely statistical.

The presiding officer, Mr. George L. Phillips, conducted the proceedings in a most satisfactory and praiseworthy manner, and although there was most serious earnestness on the part of many of the members in advancing and advocating their views, discussion rather than argument was the rule and practice of all who participated in the proceedings, and perfect harmony was the result.

The convention was called to order by Mr. Phillips, the president, with Mr. M. F. Tyler, secretary, in Parlor No. 5 of the Grand Pacific Hotel. The routine business having been disposed of, the Standing Committees, appointed at the previous convention to consider various subjects referred to them, were called upon to report. The Committee upon "Laws" asked for, and was granted, further time, as was also the Committees upon "Central Office, System and Apparatus."

In the absence of the chairman, Mr. C. W. Ross, of Columbus, Ohio, from the Committee on "Line Construction and Maintenance," stated that the Committee had not prepared a written report, but advocated the use of 8-inch cross arms in place of 4-inch, with No. 14 wire, as better than lighter arms with heavier wire. With a deeper arm and a finer wire, especially if of galvanized steel, he thought double the number of wires could be used on the same fixtures. A gain was claimed by this plan in strength, cost, weight and induction. Two wires were placed on an arm where others put one by attaching them both above and underneath the cross arm.

A lively discussion followed this verbal report, in which the comparative strength of wire from Nos. 9 to 18 was dilated upon. Compound wires of various patterns, some of which were disintegrated by chemical action and others by local electrical causes, were freely discussed.

Mr. Speed, of Louisville, Ky., asked for information in regard to insulators. Mr. Balch considered porcelain the best and cheapest made. This brought a silver-haired gentleman from Wisconsin to his feet, who remarked that a distinction should be made between insulators and drawer knobs.

Mr. C. H. Haskins, of Milwaukee, explained that the porcelain insulators of Europe, which seemed to be in the minds of the members, were a very different thing from the knobs used in America. The former were an expensive affair, costing sometimes as high as 60 cents each. Porcelain was used in Europe where glass could not be, on account of the hygrometric properties of the latter. Porcelain was not necessary here, but a good insulator should be so arranged—and the best way was by means of a deep petticoat—as to prevent a drop of water making a contact at its lower edge, and to keep a dry surface somewhere between the wire and the support.

The session was adjourned to meet in the afternoon in the court room of the Appellate Court, the room occupied for the morning session proving too small to accommodate the number attending the convention.

At the afternoon session the subject of "Lightning Arresters in Towers" was cursorily discussed by several members, with views largely differing as to their necessity.

The Committee on "Cables" (Messrs. H. W. Pope, of New York, W. H. Boffinger, of New Orleans, and C. H. Haskins, of Chicago) was called.

The report presented by Mr. H. W. Pope, which in his absence was read by Mr. C. H. Haskins on "Subterranean Lines" was very complete and interesting. After dwelling upon the importance of the subject under consideration, and the probability of immediate forcible action on the part of municipal authorities to place lines underground, it treated of the various phases of induction, and suggested remedies.

The report quotes quite fully from English Electricians who have experimented largely with telephones on subterranean and submarine lines, and concludes that no difficulty is to be experienced in the use of telephones thereon for distances likely to be worked underground in cities.

The various systems and inventions for subterranean lines are mentioned and explained. The committee in conclusion recommend the systems of Messrs. Sewall, of Albany, and Mackintosh of New York city, as possessing more good qualities than any which the committee had had under consideration.

In the discussion which followed the reading of his report, Mr. Patterson, of the Brooks Oil Cable Company, made a handsome record for these cables

of varying lengths, from a few feet to several miles.

Mr. Sargent, of Philadelphia, described the Bell cable which he was using, made with twin wires, insulated from each other, but twisted intimately together. One of each pair was grounded at each end. Eighty-two wires thus covered with cotton soaked in rosin and coal oil, were bunched and drawn into a lead pipe filled with the insulating compound forced into it.

Prof. Barrett described a recent Chicago invention which he had experimented with, and with good results. Naked wires are drawn through glass tubes, and the whole placed in lead pipes. The vacant space is then filled with a composition of resin and tallow. Subsequent bending of the cable may break the glass, but does no harm to the insulation, for the pieces cannot escape. The mechanical effect of the glass is to keep the wires apart. He had high hopes for this cable.

An almost identical cable was referred to as having existed experimentally in New York some years ago. It measured almost perfect after having been submerged in water for several days. Mr. C. H. Haskins testified to having measured it electrically (with Mr. Frank L. Pope) with the happiest results.

Several committees were called for reports, but none of them being ready, the convention adjourned until the next morning.

On the opening of the second day's proceedings of the convention, the report of the treasurer was read, and, on motion, it was ordered that an assessment of not exceeding \$5.00 be made by the Executive Committee on each member of the association to defray the expenses of printing the report of the convention and for other purposes.

Upon an informal ballot, New York was selected as the place, and Tuesday, September 6th, as the time, at which the next regular meeting should be held, but this action, so far as the place of meeting was concerned, was subsequently rescinded, and Saratoga finally decided upon as the location for the September meeting.

Mr. C. C. Haskins, of the Chicago Telephone Exchange, then read a contribution to the committee on "Auxiliary Systems," which drew out a general discussion, and thoroughly ventilated the American District and allied systems, from the Atlantic to the Pacific.

A Connecticut delegate explained a perfect system of time signals, by which the Connecticut Telephone Company's several exchanges in some seven towns received exact time at noon, of each day, through an automatic regulator which corrected any slight error that occurred each 24 hours.

Mr. Hall, of Buffalo, explained how large gains accrued to his exchange by making purchases of theatre tickets for subscribers and others, in case of a rush for reserved seats.

Messrs. Durant, of St. Louis, Haskins, of Milwaukee, father and son—Eckert, of Cincinnati, Hall, of Buffalo, and others, discussed the value of telephones as substitutes and auxiliary aids to fire alarm systems. One gentleman—representative of an exchange in a town too small to indulge in the luxury of a full set of Gamewell & Co.'s apparatus, brought down the house by stating that in one case an alarm, which was sent in from a boy in his exchange, brought the firemen to the house before the inmates knew there was a fire—it was a false alarm.

Mr. Sabin graphically described a new adjunct to the telephone exchange business in San Francisco—an information bureau, where anything in the way of knowledge could be obtained by asking and paying for the connection.

At the close of the discussion Mr. Geo. B. Engel,

Jr., was delegated to prepare a paper on "Fire Alarm and Messenger Systems" for the next meeting.

Mr. George G. Baker, of Akron, Ohio, followed with a paper on "Call Bells and Combination Lines," and said experience was fast doing away with the battery and introducing the magnetic call system.

Mr. Jackson, of Detroit, submitted the report on "Office Supplies," and Mr. Fay, of the Chicago Exchange, suggested that more statistical information was wanted from the exchanges, and proposed that at the next meeting representative should come prepared to give the following data:—Number of wires, operators, pay-roll footings, time of connections, delay in disconnections, etc.

The chairman stated that the reports heretofore had been by no means uniform, and were of little value for that reason. In the near future it is to be hoped some uniform methods of getting exact results would be adopted, when they would be given to the convention, and be of great value.

A recess was then taken until 2 30 P. M.

Upon assembling at 2.30 P. M., an executive session was held.

Mr. Eckert, of Cincinnati, Mr. Sargent, of Philadelphia, and Mr. Hall, of Buffalo, each contributed matter of importance of a statistical nature. From one of the papers read, a curious fact was gleaned—that while the smallest and the largest of the exchanges were relatively handling about the same pro rata of calls, the medium-sized exchanges were not doing relatively so much in that line. The solution of which anomalous condition seems to be that a small exchange can clear itself of all the business that comes in with despatch. There is a point in the growth of the exchange when the small office facilities will not accomplish the work, and in the largest exchanges necessity has compelled the increased facilities which will enable it to clear its hooks on time, and encourage its customers to husband both their patience and their postal cards.

At the evening session, Mr. Wiley W. Smith, of Indianapolis, occupied the chair.

Messrs. Sargent, of Philadelphia, and C. H. Haskins, of Milwaukee, from the Committee on "Electrical Disturbances," made verbal reports. Mr. Sargent stated that a line must be drawn between leakage and induction. What was needed was better insulation. No device had been successful to prevent leaking—one of the greatest hindrances to success.

Mr. Haskins very elaborately explained the laws and action of induction, and very clearly pointed out the effects of poor ground connections.

Mr. Chinnock followed with interesting information relative to difficulties in obtaining good grounds. The electric light wires, he held, were not so dangerous in character as by reputation. They might—sometimes did—interfere with grounds in the neighborhood of telephones if grounded to the same water pipes. A wire run at right angles to ground, a block or so away, defeated this action.

A general discussion followed, and some amusing anecdotes of good ground hunting were brought out. It was a well established fact that the failure of lightning-rods to do their work properly, resulted from poor earth connections. Wires and rods should go to water—be connected to water-pipes, or run into wells—and the joints should be well soldered.

Mr. Haskins of Milwaukee illustrated Mr. H. C. Haskins' exchange in that city, which by general consent was accorded the highest praise for quiet, rapid work.

Previous to adjournment Mr. Fay announced to

the convention that carriages would be in waiting at the hotel the next morning—Thursday—to convey such as desired to the various exchanges on a tour of inspection; and that at half-past twelve the Superintendent of the Fire Alarm Telegraph, in accordance with that gentleman's invitation, which had been accepted by the convention, would give an actual test of the new system of fire and police alarm for their information and benefit.

The proposed tour of inspection was accordingly made through the several exchanges, and at the time appointed, after fully explaining the working of the police alarm system at one of the alarm houses, Prof. Barrett said, "Gentlemen, look at your watches," and pulled the lever. In 2.46 minutes, the wagon with 3 policemen stopped in front of the house, having come about $\frac{1}{4}$ of a mile, the driver looking like an April fool, at the applauding crowd. Finally, seeing Barrett, he came to know the cause, and felt better.

Thence, after inspecting the wagon and its contents, a visit was made to the fire and police station, from whence the run was made, where the captain of the Engine company turned in three drill alarms for the benefit of those present. A single tap of the gong was all. The doors flew open, the horses ran to and stopped at their places, the up-stairs men slid down perpendicular poles to the floor, the snaps were clicked on the harness, men mounted the apparatus, and all was ready for a fire run. Thrice this drill was shown, with an average time for each, of eight seconds—and the men did not half try, apparently.

The New York Electrical Society.

The First Meeting in the New Quarters at the Cooper Institute.

THE first meeting of the New York Electrical Society in the new quarters generously accorded for their use by the managers of the Cooper Union, was held on Thursday evening, April 7th. The room which will be occupied by the society for its future meetings is the Chemical Lecture Room, in the fourth story of the Cooper Institute Building, and is excellently adapted to the purpose. The only drawback is its height from the street, and the fact that the elevator does not run in the evening.

The room itself is amply provided with all the requisites for scientific lectures and demonstrations. The amphitheatre is occupied by seats, which rise gradually, so as to afford a good view of the platform and counter, arranged for the display and manipulation of batteries and apparatus required to illustrate the lectures, from any part of the room.

There was a good sized audience present, and very deep interest was manifested in the proceedings from the opening until the adjournment, about half-past ten o'clock.

The meeting was called to order soon after eight o'clock by President Jones, and the routine business was quickly despatched. Sixteen additional members were balloted for and unanimously elected.

The President desired the views of the society as to the suitability of the room selected for their meetings, for the guidance of the Executive Committee, and explained the disadvantages of the location, the latter being its distance from the street, and the necessity imposed upon those who might attend of climbing so many stairs. This, however, was not considered a serious matter, and, on motion, the Executive Committee was instructed to make the necessary arrangements to secure the Chemical Lecture Room for the future use of the Society.

Mr. Geo. B. Scott was then introduced, and proceeded to explain the

Electrical Movements by the Wheatstone Bridge. To show the simplicity of the galvanometer, Mr. Scott, manufactured one with some common sewing needles and insulated wire, which he used in explaining and illustrating his subject. With the necessary apparatus, and diagrams on the black board, the lecturer exhibited and explained the action of electric currents and their course under different circumstances and the theory upon which the Wheatstone Bridge is constructed and used. He was very happy in his style of instruction, and evidently had thoroughly studied and understood the subject.

At the conclusion of Mr. Scott's lecture he was enthusiastically applauded, and a vote of thanks heartily given.

The President said that it was the purpose of the Executive Committee to vary the programmes dividing the meetings, so that a part should be devoted to somewhat elementary instruction for the younger and less advanced members of the Society similar to what had been so happily given them to-night; and others would be devoted to the development of more advanced scientific subjects.

Prof. Van der Weyde profitably and agreeably occupied a few minutes in still further explaining the subject of electrical measurement, by means of a diagram he had prepared. He also exhibited several rheostats, explaining the advantages and disadvantages of each, finally showing the audience one which had been recently manufactured for him by J. H. Bunnell & Co., from plans and specifications furnished by himself, which he thought more nearly perfect and accurate than any other known to him. He spoke very highly of the perfection and accuracy of the mechanical execution of the rheostat by the manufacturers.

At the conclusion of Professor Van der Weyde's remarks, the meeting adjourned until Thursday evening, the 21st instant, at 8 o'clock P. M., at the same place.

Sensitiveness of the Telephone.

MR. W. H. ASH, of the Eastern Telegraph Company, Porthcurnow, Penzance, in a communication to *The Electrician* gives an account of some investigations he has recently made, demonstrating the extreme sensitiveness of the telephone.

There are two cables landing at Porthcurnow, one from Vigo and the other from Lisbon, both of which happened to be broken at the same time, the former in Vigo Bay, the other about 730 miles from Porthcurnow. The two cables were joined together through a telephone, "The other two ends being so far away," he says, "I was curious to know what I should hear, and was very much surprised to hear Morse signals. After listening some time, I found it was on the Brest cable of the new French Atlantic Company, their line running from Penzance to Brest (the cable lands about three-quarters of a mile from here), and their land line going to Penzance by a different route from this Company's; so that with no earth connections here, and none on the other line except at Penzance and Brest, I could read the signals distinctly. No doubt it was by the induced current, but that it can be perceived at such a distance may suggest to some still further uses for this very delicate instrument.

Personal.

MR. A. L. PHILLIPS, agent and operator C. & E. I. R. R., at Bloom, Ill., desires to ascertain the present address of W. H. Boga, telegraph operator. Any one who can give the desired information will confer a favor by addressing Mr. Phillips.

Mr. J. D. Reid, of the Western Union Executive Offices in this city, has received by cable infor-

mation that his daughter has been stricken with paralysis in Paris, and with his wife sailed in the steamer *Canada* for Havre on Wednesday last. Mr. Reid has the sympathy of his extensive circle of acquaintances and friends in this affliction.

Any information of the whereabouts of W. R. Johnston, operator, formerly employed on the Chicago division of the Wabash Railway, will be thankfully received by his friend, V. L. Bean, St. P., M. & M. Railway, St. Paul, Minn.

The Pond Visual Indicators and Transmitters.

MR. C. H. POND, has invented and patented an indicating system and apparatus, adapted to all the purposes to which such a system can be applied, which appears to be far superior to anything of the kind heretofore offered to the public. The machinery is very simple in construction, reliable, and not likely to get out of order. It has been adopted by the Gamewell Fire Alarm Telegraph Company, of which Mr. Pond has been elected a trustee, and is highly commended for district telegraph purposes, and in hotels and large buildings where it is necessary that indicators should be used. By this system four figures can be instantaneously displayed at any required distance upon simply pulling a catch, and any purpose for which the call is made is indicated with the number.

These indicators can be seen at the office of the Pond Indicator Company, at No. 130 Fulton street, in this city.

A Novel Invention.

WE have examined a new and certainly valuable improvement in the way of an electric wire fence, patented by Dr. J. H. Connolly, of Pittsburgh. It is claimed that it will not tear or lacerate stock, as it does away with the barb or spur, and that it will repel the stock or other intruders promptly, as it gives a sharp stinging tremor or shock when touched. It is also more easily seen than other wire fences, from the fact that the plain galvanized wires are not twisted together, but placed one inch apart upon suitable insulated wooden posts, with as many such courses of wire as may be desired.—*Railway Reporter*.

Scientific Notes.

SWEDEN has decided to take part in the international meteorological and magnetic observations in the Polar regions, and will establish two observatories, one at Musselbay, in Spitzbergen, and one at Hasparanda, at the head of the Gulf of Bothnia. Hasparanda is to be well supplied with self-registering and printing meteorological apparatus, and with astronomical instruments to carry on a series of regular observations.

M. Dunaud, in a paper presented before the Academy of Sciences, has shown that if a microphone be placed in a circuit with the primary wire of an induction coil, and the secondary be joined in circuit with a battery and a Varley's condenser, that speech is reproduced in the latter from the microphone. This effect is not produced unless a battery is in the secondary circuit.

In the issue of *Nature* for January 20th, Lord Rayleigh gives a mathematical investigation of the impact of intermittent radiation upon their plates, of various substances, in which he seeks to prove that the phenomena observed in the photophone are explicable upon the assumption that there is a periodic communication and abstraction of heat upon the diaphragm.

Ordinary letter paper, if well heated and briskly rubbed with the hand or with a brush, acquires

electric properties; it adheres to tables, walls, etc., and on contact with the hand it gives slight electric discharges, visible in the dark. But on taking Swedish filter paper, and submitting it to the treatment described below, its electric properties are greatly intensified, and sparks may be drawn from it several centimeters in length. The paper is steeped in a mixture of equal volumes of nitric and sulphuric acid, as in the manufacture of gun cotton. The paper thus pyrooxidized is washed with abundance of water and dried. If laid on a sheet of waxed paper and rubbed briskly, it manifests energetic action, and may be used for repetition of almost all experiments in static electricity.—*Comptes Rendus*.

Sir W. Thomson has made experiments which show that by moistening the opposing surface of a volta-condenser, and substituting a water arc for a metallic one in the determining contact, there is no measurable difference of potential when contact is made by means of a drop of clean water between opposed polished surfaces of zinc and copper; and that the action of dry polished zinc and wet oxidized zinc when opposed to dry copper and brought into contact by a metallic arc are similar.

Dr. Meyer, Assistant Astronomer at the Geneva Observatory, has employed the microphone in transmitting the beats of the standard clock of the Observatory to different parts of the building, and also to the Regulating Clock of the city Time Service. The microphone is fixed upon the outside of the clock-cam and placed in circuit with a small battery and a telephone. The beats of the clock can then be readily heard throughout the room.

Electric Motors.

FOR such a power, one that can at any time be increased to meet the utmost demands, we must, therefore, look to some other agency than water. Compressed air is, without question, an available one, and the motors in which it could be used are comparatively simple, but, as it could only be employed for this one purpose, (unless, indeed, sanitary advantages were realized), the present or prospective demand would hardly warrant its adoption. The agent that appears to be the most suitable, and that gives promise of utility in other directions as well, is electricity. Distributed from a central source of supply, all the advantages of a safe and convenient power would be obtained, without any of the disadvantages attendant upon the use of other forms of energy. Of the feasibility of economically distributing the electric current there is a growing confidence among electricians, and the advantages of so transmitting power have been frequently urged of late, not only for moving light machinery, but for doing all the work now done in our factories by the steam-engine.

Distribution accomplished, the machines by which the current is utilized are very simple, and need not be expensive. As remarked by Dr. Paget Higgs, they are so much cast-iron and insulated copper wire, and their construction requires none of the skilled work necessary in the various forms of heat-engine. The construction is practically the same in the essential parts, whether they be used as current generators or as motors.—CHARLES M. LUNGERN in *Popular Science Monthly* for February.

ELECTRIC BELLES—Female telephone operators.

DIED.

SAME.—At Bowerston, Ohio, April 4, 1881, after a brief illness of one month, of typhus fever, PORTER SAME, operator, Pan Handle Road, aged 24 years.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, April 16, 1881.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

GENERAL INFORMATION.

BRITISH COLUMBIA.

- * Langley, closed. S.
- * Mount Begbie, closed. S.

CALIFORNIA.

- Big Trees, C. Co., closed.
- * Brownsville, closed. S.
- Cana, closed.
- * Collinsville, reopened. S.
- * Congress Springs now 25 2 by telephone from Santa Clara. S.
- * Gibeonville, closed. S.
- * Hepesdam, closed. S.
- * Howland Flat, closed. S.
- * La Port, closed. S.
- Litton Springs, closed. S.
- Moscow, closed.
- * Saratoga now * Saratoga, 25 cents delivery from Congress Springs. S.
- * Strawberry, closed. S.

COLORADO.

- 557 Plum changed to 557 Sedalia. S.

CONNECTICUT.

- 32 Wolcottville changed to 32 Torrington.

DACOTAH.

Until further notice, business for all offices in Dacotah, except those on "other" lines via Cheyenne, Wyo., should be subject to delay, caused by interruption of lines by storms.

IDAHO.

Government messages to Boise City will hereafter be charged full commercial rates for "other" lines beyond Winnemucca, Nevada.

INDIANA.

- 272 St. Louis Crossing, reopened. S.

KENTUCKY.

The following, at present "other" line offices, will on and after May 1, 1881, be checked direct:

- | | |
|------------------------|---------------------|
| 254 Burgin Sta. | 254 Moreland. |
| 243 Corinth. | 234 Nicholasville. |
| 244 Flat Rock. | 244 Norwood. |
| 238 Crittenden. | 244 Pine Knot. |
| 254 Danville Junction. | 244 Point Burnside. |
| 244 Greenwood. | 243 Sadleville. |
| 254 High Bridge. | 233 Silver Lake. |
| 254 Kings Mountain. | 244 Somerset. |
| 233 Ludlow. | 244 Tateville. |
| 254 McKinney. | 243 Williamstown. |

LOUISIANA.

- * Breau Bridge, closed. S.

MAINE.

- * Bar Harbor now 20 2 Ellsworth. a.

MASSACHUSETTS.

25 West Upton now * West Upton, 25 2 by telephone, Worcester. S.

MEXICO.

The land lines leading south-easterly from Vera Cruz towards the States of Compeche and Yucatan are interrupted. A list of the offices cut off has been requested, and may be published in the next JOURNAL.

MICHIGAN.

- * Nottawa, closed. S.

The following are charges for delivery from Detroit to places named. See Detroit in tariff book: a.

- * Fort Wayne, 35 cents.
- * Race Course, 35 cents.
- * Hamtramck, free.
- * Spring Wells, 25 cents.
- * House of Correction, free.

MONTANA.

* Butte City and * Deer Lodge are now half-rate offices. Until further notice, business to other line offices in Montana "via Milwaukee, Wis." should be accepted subject to delay. (See Dacotah above.)

NEVADA.

Government messages will hereafter be charged full commercial rates for "other" lines from Winnemucca to Camp McDermitt.

NEW JERSEY.

- 41 Weehawken P. O. A. is Hoboken, Station A.
- 41 Mountain View is now checked direct. S.
- 41 Wayne, closed. S.

NEW MEXICO.

- 630 Gramma, closed. S.

NEW YORK.

- * Huletts Landing (M. O.), reopened. 20 1 Whitehall, Oswego, or Montreal Junction. S.
- * Merrittsville, closed. S.
- * Rogers Rock Hotel (M. O.), reopened. 20 1 Whitehall, Oswego, or Montreal Junction, S.
- 46 Sandburgh changed to 46 Mountain Dale.

The following, at present "other" line offices, will hereafter be checked direct:

- | | |
|---------------------|------------------|
| 41 Alms House. | 40 East Jewett. |
| 45 Broadalbin. | 40 East Windham. |
| 40 Blue Store. | 40 Freehold. |
| 40 Big Hollow. | 40 Greenville. |
| 40 Cairo. | 45 Mayfield. |
| 40 Durham. | 45 Northville. |
| 45 Cranberry Creek. | 74 New London. |
| 74 Durhamville. | 40 Oak Hill. |
| 40 East Durham. | 40 Red Hook. |

OHIO.

* Farmersville is in Montgomery Co. S.
* Point Marble Head will hereafter be checked direct; tariff 25 cents more than Sandusky. a.
The following, at present "other" line offices, will on and after May 1, 1881, be checked direct:

- | | |
|--------------------------|---------------------------|
| 213 Bainbridge. | 222 Jeffersonville. |
| 213 Greenfield. | 222 South Solon. |
| 192 Jackson, Jackson Co. | 213 Summit Hill, Ross Co. |

ONTARIO.

- * Milburne, reopened.

OREGON.

- Beaverton, closed. S.
- Deschutes, closed. S.
- * Scotts, closed. S.
- Summit, closed. S.
- Willows, closed. S.

PENNSYLVANIA.

* Airville, York Co., will hereafter be checked direct in square 67. S.
* Hulmeville will hereafter be checked direct in square 47. S.

QUEBEC.

- * St. Joseph de Levis, closed. S.

RHODE ISLAND.

The cable between Narragansett Pier and Block Island has been repaired; tariff for "other lines" to Block Island is 25 1 from Narragansett Pier. S.

TENNESSEE.

The following, at present "other" line offices, will on and after May 1, 1881, be checked direct;

- | | |
|----------------|------------------|
| 244 Chitwood. | 255 New River. |
| 245 Dayton. | 245 Rathburn. |
| 255 Emery Gap. | 255 Rockwood. |
| 255 Glen Mary. | 245 Spring City. |
| 255 Kismet. | |

TEXAS.

- * Dangerfield, 30 3 Jefferson. S.
- 489 New Philadelphia, closed. S.
- * Pilot Point, closed.
- * Pittsburg, 35 3 Jefferson. S.

VERMONT.

31 Chester, on page 268 of tariff book, should read 31 Chester Depot. a.

WASHINGTON TERRITORY.

- Cowlitz, closed.
- Fidalgo, closed. S.
- New Aukum, closed.
- * Nootack is now a Western Union office. a.
- Port Madison, reopened.
- * Samiah is now a Western Union office. a.
- San Juan Island, closed.

- Tanino, closed.
- White River, reopened.
- Winlock, closed. S.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

ARIZONA.

- * Dos Cabezas, 25 2 Maricopa Wells.

CALIFORNIA.

- * Hills Ferry, 50 3 Turlocks.
- * Lundy, 115 8 Virginia City, Nev.
- * Simmons, free, Chico

COLORADO.

- 623 Maysville.
- 557 Sedalia.

CONNECTICUT.

- 32 Torrington.

FLORIDA.

- * Fort George (H.R.), 100 6 Lake City.

GEORGIA.

- 256 Ridge Valley Iron Works.

ILLINOIS.

- 318 Chesterville.
- 337 Dawson.

KANSAS.

- 475 Circleville.

KENTUCKY.

- * Carrollton, 25 2 by telephone, from Worthville.

MASSACHUSETTS.

- * Upton, 25 2 by telephone, Worcester.

MEXICO.

- * Leon, 400 40 Brownsville, Texas.

MICHIGAN.

- * Harbor Springs, 25 2 Grand Rapids.

MINNESOTA.

- * Jackson (not H. R.), 90 6 Milwaukee, Wis. Ches Chicago, Ill.

MISSOURI.

- 557 Sedalia.

NEW JERSEY.

- * Woodstown, .05 cents delivery from Yorktown.

NEW MEXICO.

- 637 Cranes.
- * Oldtown, Albuquerque, 25 1 from Albuquerque.

NEW YORK.

- 46 Mountain Dale.
- * Verplancks, 15 1 by telephone, from Peekskill.

NORTH CAROLINA.

- * Greenville (H. R.), 25 2 Tarboro.

NOVA SCOTIA.

- 2 Meteghan.

OHIO.

- 232 Conover.
- 233 Newtown.
- 242 Union, Montgomery Co.

OREGON.

- * Dundee, 40 3 Woodburn.
- Grants.

PENNSYLVANIA.

- 111 Davis Switch P. O. A. care Aiken.
- 111 Ball Road Run P. O. A. care Bradford.
- 59 Willow Grove.

TEXAS.

- * Abilene, 85 6 Fort Worth.
- * Eagle Springs, 50 2 Denison or San Antonio.
- * Sweet Water, 85 6 Fort Worth.
- * Winsboro, 40 4 Jefferson.

VERMONT.

- * Chester, 15 cents from Chester Depot.
- * North Chester, 15 cents from Chester Depot.

WASHINGTON TERRITORY.

- * Spangle, 100 6 Walla Walla.

ATLANTIC CABLE.

Telegraphic communication with Turkey "Via Indo" been restored.

The cable between Pernambuco and Maranham, S. America, is interrupted. During the interruption mess for Maranham and Para will be sent by steamers leaving mambuco on the 7th, 17th, and 27th of each month. No ch in rates.

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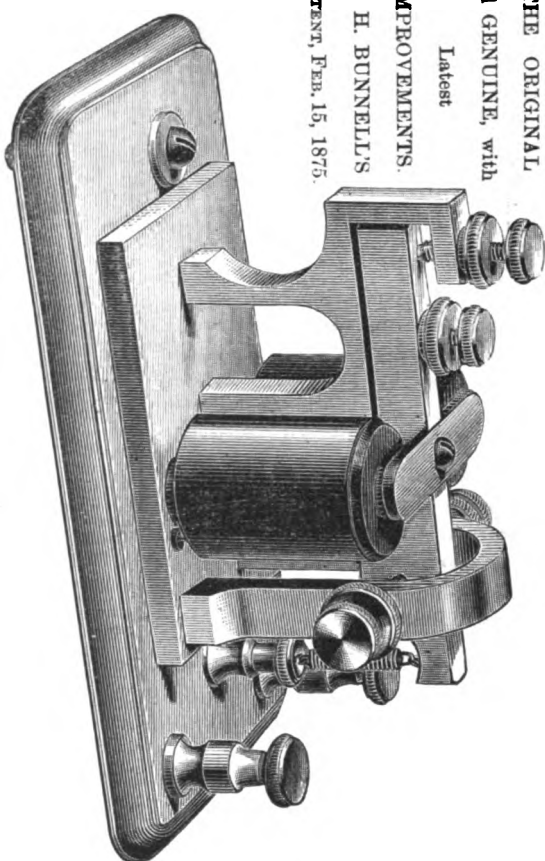
J. H. BUNNELL & CO.'S FIRST CLASS TELEGRAPH MACHINERY.

THE ORIGINAL
and GENUINE, with
Latest

IMPROVEMENTS.

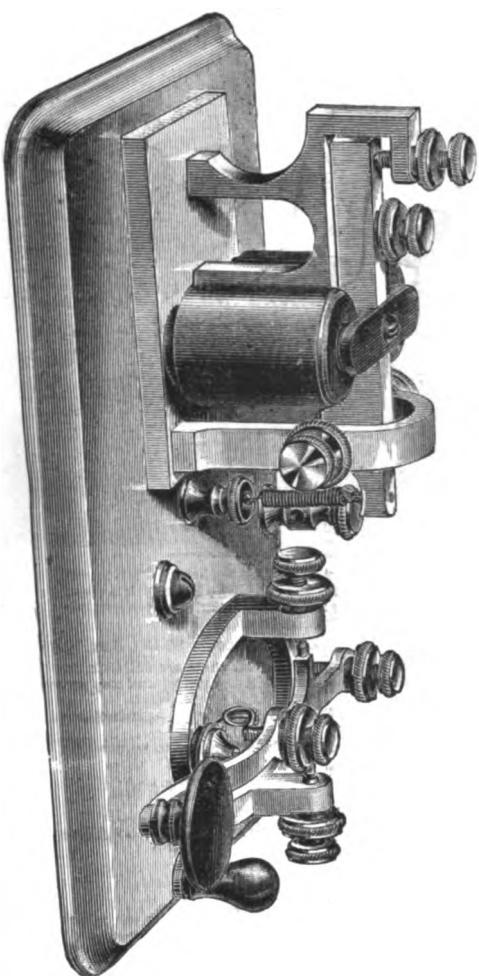
J. H. BUNNELL'S

PATENT, FEB. 15, 1875.



THE GIANT SOUNDER—UNEQUALLED!

We call attention to the fact that we are making these unrivalled Sounders, our own original invention, with our latest improvements added, at a lower price than has ever before been resold. Every Sounder warranted first-class in all respects, and with loud and clear tone. PRICE, \$5.00, carefully boxed and sent by mail, prepaid, to any part of the United States.



GIANT SOUNDER (20 OHMS RESISTANCE) AND STEEL LEVER KEY.

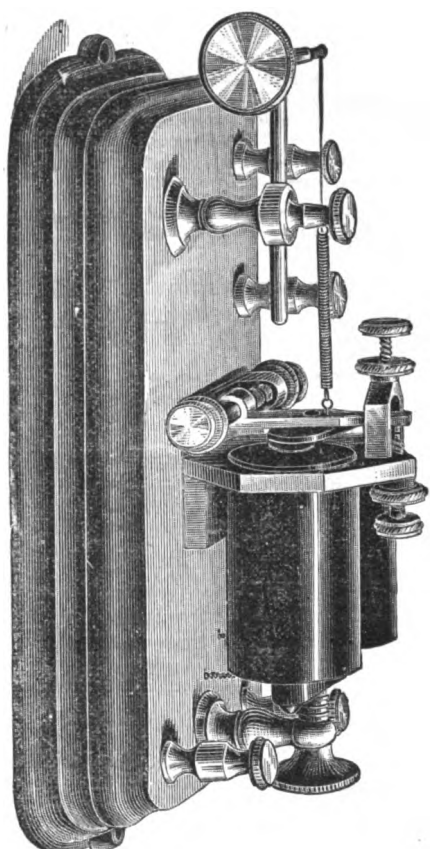
COMBINATION SET:

For Private Wires, Main Lines, etc., up to 25 miles in length—Warranted—consists of our standard first-class Giant Sounder, finely finished, with Rubber-Covered Coils, fine Silk-Covered Wire, wound to 20 ohms resistance, mounted on Polished Mahogany Base, with a Steel Lever Key, making the prettiest and most perfect set of short Main Line Instruments ever produced. PRICE, \$8.00, carefully boxed and sent by mail, prepaid, to any part of the United States.

All of these prices subject to liberal discount on orders in quantity.

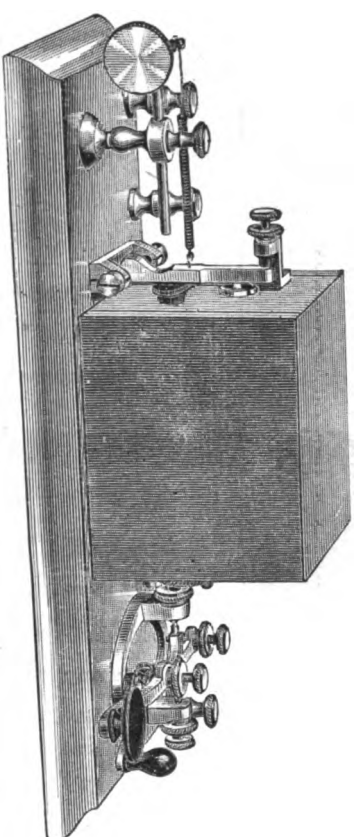
SEND FOR ESTIMATES IF YOU WANT LOW PRICES AND FIRST-CLASS APPARATUS.

J. H. BUNNELL & CO., TELEGRAPH AND TELEPHONE SUPPLIES, 112 LIBERTY STREET, N. Y.



FIRST-CLASS MAIN LINE RELAYS. WESTERN UNION STANDARD.

150 ohms resistance, Silk-Covered Wire, Polished Rubber-Covered Coils, Mahogany Base, mounted on Ornamental Subbase, Extension Adjustment. PRICE, \$8.50.



BOX SOUNDING RELAY AND STEEL LEVER KEY.

COMBINATION SET.

For Main Lines up to 600 miles in length. Of best construction for loud, clear sound, without local sounder. Polished Mahogany Box and Base; 150 ohms Silk Wire.

Price, with Steel Lever Key on base, \$12.00; without Key, \$9.00.

BISHOP GUTTA PERCHA WORKS.

ESTABLISHED IN 1847.

S. BISHOP, Proprietor.

Manufacture and sell, under Letters Patent No. 65,019,

GUTTA PERCHA INSULATED

SUBMARINE, UNDERGROUND, AERIAL, OFFICE,

Canal, Lead-Covered, Telephone, Torpedo and Hemp Armor

CABLES.

GUTTA PERCHA

Office Wire, Fuse, Leading and Connecting Wires,
for Subaqueous, Mining and all other Electrical Purposes.

MARKS' COMPOUND

INSULATED TELEGRAPH WIRE,

For OFFICE, outdoor, underground and BATTERY USE

G. P. OFFICE WIRE, Cotton Covered.

ALSO HAVE ALWAYS ON HAND

WIRES OF EVERY VARIETY OF INSULATION,

MAGNET WIRE, TELEPHONE FLEXIBLE CORDS,

FLEXIBLE ELEVATOR CABLES, ELECTRIC CORDAGE,

BURGLAR ALARM & ANNUNCIATOR WIRE,

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PURE GUTTA PERCHA GOODS,

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420, 422, 424 and 426 East 25th Street,

OFFICE AT THE WORKS.

NEW YORK

AGENT, L. G. TILLOTSON,

7 Dey Street, New York,



CARDS! CARDS!!

Your name finely printed on 15 Bevel Gold-edge Cards, with or without a small Key or Pigeon Embellishment engraved on the upper turn-down corner, for 25 c.; or, 75 with address, if desired, for \$1.00: or 25 assorted Electrotype Cards of Keys, Sounders, Relays, &c., for 20 c. 25 Embellished Keys, 20 c. 25 Transparent Picture Cards, new and rich, 20 c. 25 Tinted Portraits of Actresses, (Bernhardt, &c.), no name, 20 c. 25 side-splitting Comic, no name, 20 c. 25 laughable Flirtation Cards, 20 c. One Russia Card Case, two pockets, 20 c.; Morocco, 10 c. Samples of Cards, 10 c. We have the Bevel Gold-edged Cards, engravings for nearly all kinds of business. You can make money by selling them in your town, as all business men will appreciate them. Samples and terms, 10 c. Silver wrapped in paper comes safely. Address

F. P. MUNN, CLYDE, Wayne Co., N. Y.

PROPOSALS FOR ICE.

THE WESTERN UNION TELEGRAPH COMPANY invites proposals until 12 o'clock noon, Monday, April 25th, 1881, for supplying ice at its building on Broadway and Dey street, for 12 months as follows:

Five months, from June 1st to October 31st, about 40,000 pounds per month, and 7 months, from November 1st to May 31, 1882, 80,000 pounds per month. The deliveries to be made daily (Sundays excepted) between the hours of six and seven o'clock, A. M.

(The quantities named are only estimates, and the amounts required may be more or less than those given.)

The ice to be subject to inspection, and none but clear, good ice will be received, and it is to be weighed as delivered.

Bidders will please state price per hundred pounds for five months, from June 1, 1881, to October 31, 1881, and for seven months, Nov. 1, 1881, to May 31, 1882.

Payments to be made between the 15th and 25th of the month following the deliveries.

The right is reserved to reject any and all bids, or accept any which may seem for the best interests of the Company.

The party whose tender is accepted will be required to give bond with two sureties for the proper fulfillment of the contract.

Proposals should be sealed and addressed to the undersigned, and endorsed

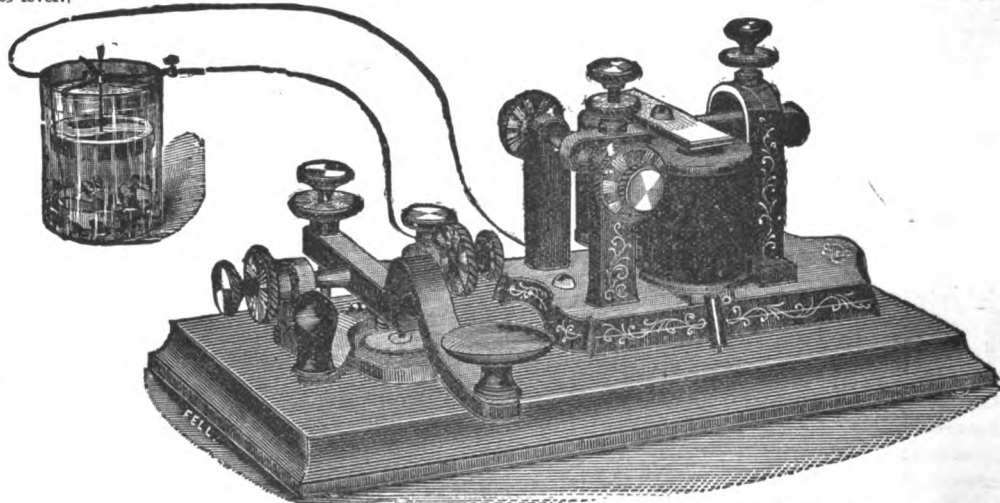
"PROPOSALS FOR ICE."

WM. HUNTER,

Sup't Supplies.

New York, March 25, 1881.

[Through a mistake of the engraver this cut is reversed, the Key on the right of the Sounder, and Circuit on the right of the Key-lever.]



The above cut is a true representation of my No. 2 SHERIDAN INSTRUMENT. The Sounder and Key are full-sized Instruments. The base on which they are mounted is 7x4 1/4 inches. The Battery is a regular Main Line Calland Battery 5x7 inches. The Sounder and Key will be furnished separate or on same base, to suit parties buying. The full set consists of 1 Sounder, 1 Key, 1 Cell Battery, Package Vitriol, 15 feet Office Wire, and an Instruction Book.

PRICE OF COMPLETE OUTFIT, \$4.25 No. 2 SOUNDER, ALONE, \$2.50 KEY, ALONE, \$1.25. BATTERY, \$1.00.

These Instruments are well made and nicely finished. The Magnets are full size, and will be wound to work well on from a few feet to five miles of line. They are WARRANTED to be worth the price, and any person buying a set of them who is not satisfied can return them and I will refund the money.

I also have on hand a good stock of Electric Call Bells, Burglar Alarms, Annunciators, Medical Instruments, all kinds of Telegraph Instruments, etc., at very low prices.

In ordering Telegraph instruments please state length of line they are to be used on.

Send for illustrated Catalogue and Price List.

Address,

A. B. LYMAN,

36 SOUTH WATER STREET, CLEVELAND, O.

L. G. TILLOTSON & CO.,

5 & 7 DEY ST., NEW YORK,

Manufacturers and Dealers in

TELEGRAPH & TELEPHONE
SUPPLIES

OF EVERY DESCRIPTION.

HEADQUARTERS

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TELEGRAPH LINE MATERIALS, BATTERIES,
INSTRUMENTS AND SUPPLIES.

THE LOWEST PRICES.

THE LARGEST STOCK.

ALL THE LATEST & BEST IMPROVEMENTS
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SUPPLIES FOR COMMERCIAL TELEGRAPH LINES.

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SUPPLIES FOR PRIVATE TELEGRAPH LINES.

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SUPPLIES FOR FIRE ALARM TELEGRAPHS.

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FOR

PATENT SCREW INSULATORS, PONY INSU-
LATORS, LECLANCHE BATTERY,
GUTTA PERCHA CABLES,
ETC., ETC.THE JOHN A. ROEBLING'S SONS
COMPANY,

TRENTON, N. J.,

And No. 117 LIBERTY STREET, NEW YORK,

MANUFACTURERS OF

GALVANIZED TELEGRAPH WIRE,

AND

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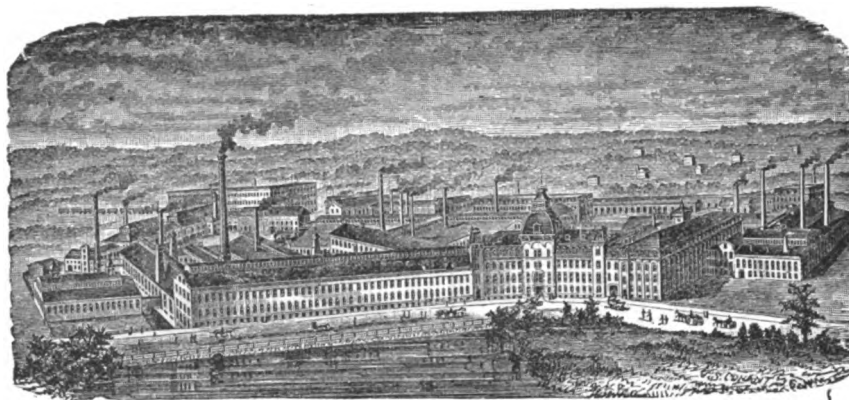
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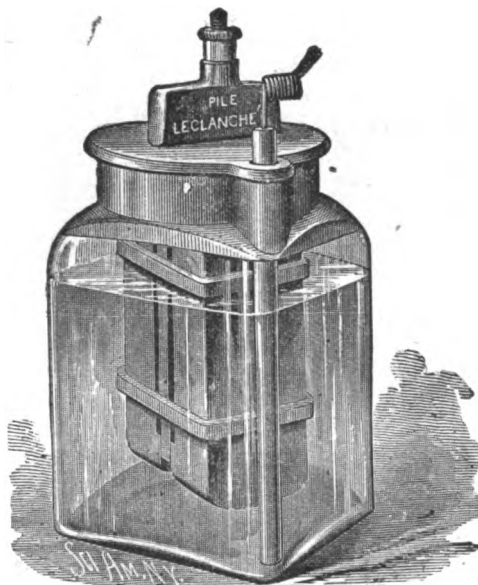
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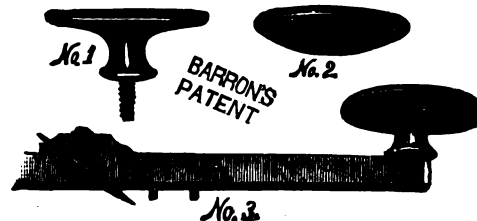
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Respectfully, H. H. HENRY.

Mr. W. J. BARRON: Mr. Henry is one of our most experienced operators, and a person who would not give an opinion like the above unless the article had merit. He sends about 10,000 words per night.
Yours, etc., A. S. DOWNER.

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JOURNAL OF THE TELEGRAPH.

VOL. XIV.

NEW YORK, JUNE 1, 1881.

WHOLE NO. 326.

FAURE'S SECONDARY BATTERY.

It has recently been reported by the French scientific press that Mr. Camille Faure, of Paris, whose improvement of the well-known Bunsen battery, by which it is better depolarized and its deleterious fumes reduced, has again signalled himself by another improvement in batteries. This time it is the Planté secondary battery which has occupied his attention.

For those unacquainted with Planté's beautiful researches with secondary batteries and the results obtained we will state briefly that this savant succeeded by using two lead plates in water, acidulated with about 1-10th sulphuric acid, in storing electricity in amounts far superior to anything before known. The elements thus formed being connected with a battery, received a certain charge of electricity. On being discharged it was found that a reversal of the current for the second charging produced an improvement in the storing capacity of the secondary battery which increased still more with successive reversals and longer connection with the charging battery.

The forming of these plates, however, took considerable time, and the current derived from them was anything but steady, being very strong at first but gradually falling off when the battery was on closed circuit, this was especially marked when the latter chanced to be of comparative low resistance.

Faure remarked that the choice of lead plates by Planté was good, but that all that was required was to increase the capacity of the battery and to suppress the long and costly process necessary to form the plates. The capacity being due to the thickness of the layer of peroxide of lead on one plate and spongy lead on the other, Faure perceived that these results could be practically obtained by depositing a coating of minium or red lead upon the lead plates, securing it there by felt, fastened to each plate by lead rivets. These electrodes can be rolled spiral like so as to obtain an element of the smallest possible bulk; but other forms could of course be employed in view of securing especial advantage.

If after this said secondary element has been constructed as just described, it be charged to saturation and the plates afterwards analyzed, one finds that one of the minium layers has been entirely transformed in peroxide of lead, while the minium layer of the other electrode has been reduced to lead, which leads to the conclusion that one of the layers gets more oxydized while the other became desoxydized.

The electric capacity of the element can therefore be expected within certain limits to depend upon the quantity of minium deposited upon the electrodes.

It appears from the reports that the electro-motive force of the element carefully measured amounts to 2.25 volts, which is superior to the electro-motive force of the Grove or Bunsen batteries.

At the same time the resistance as in the Planté battery remains very small, depending of course,

to a great extent upon the surface and proximity of the electrodes. Another minor improvement, also due to Mr. Faure, is the substitution of a lead cell for the glass jar in the first arrangement, and which thus becomes one of the elements of the battery.

The internal resistance of a single cell 10 inches high by 5 inches in diameter has been measured, and found to be 0 ohm, 006, which, as is well known, is a most advantageous circumstance for many industrial applications.

It appears, as reported by Mr. A. Niaudet, that in one experiment 22 cells of the new battery coupled in tension have produced an arc light between two carbons of 4-5 inch diameter, which would have required a large gramme machine run by a motive power of ten or fifteen horse power.

The same battery, according to the same authority, has been used to drive an electro-magnetic machine of large size, and the work derived therefrom when measured, was found to amount to 723 foot pounds per second.

We are informed that a Faure's battery weighing about 165 lbs. is capable of giving out an amount of electricity equivalent to one horse-power for one hour, and that as much as 80 per cent. of the original amount of electricity expended in charging it can be recovered from the battery.

Sir William Thomson, according to a late cable telegram, said of the new battery, after the first test of a sample of the stored electricity, which had reached Glasgow from Paris in 72 hours, "Why, it is a Little Giant."

Should these reports be confirmed by actual experiments the new storage battery could not only replace the former primary batteries in many cases, and be used where the latter could not be conveniently employed, but it would also replace dynamo machines in many cases, and be similarly called in use where dynamo machines and steam engines would be of impossible, difficult or costly use, though the reader must not lose sight of the fact that to charge said secondary battery, as the name implies, recourse will have to be had to either primary batteries, or in most cases to dynamo machines run by some outside power.

[Translated from *La Lumière Electrique*.]

On Electrical Quantities and their Measure in Absolute Units.

M. BLAVIER has sent us an important work, on which he has been employed for some time. The subject is on electrical units of measurement; and to understand the importance of a rational system in these matters, it is not sufficient, as some persons suppose, merely to understand the definition and the relative values of the units adopted in the English system; but one should also know the reasons why they were adopted, the mathematical correlations which connect them together, and the manner in which the system is applied to the formulæ rep-

resenting the different laws of electricity and electro-magnetism. It is this work that M. Blavier has undertaken, and to show that it is not a slight one, it is only necessary to state that it occupies 588 pages. M. Blavier is perfectly competent for the task he has undertaken, having been specially occupied in these matters during the past twenty years. The work is not likely to ever become popular, belonging as it does to the highest sphere of philosophy, and being thickly sown with mathematical formulæ, but the deductions it contains are clear, and will satisfy any philosophical mind, however scrupulous. In one word, it is a book on mathematical physics.

In the first chapter, M. Blavier gives a history of the different attempts made to procure and adopt a system of units of electrical measurements, essays which have reached their successful termination in the co-ordinated system of units of the British Association. In the second, he passes in review the absolute mechanical units, which he classifies as *fundamental units* and *derivative mechanical units*, then he studies in chapters three and four electro-static quantities and their measure.

In chapter five he passes in review the laws of electric currents and the means of measuring in electro-static units, their strength, and the resistances opposed to them.

In chapter six he studies the origin and properties of electrical currents, then he passes in chapter seven to the electro-dynamic units, after having explained the electro-dynamic phenomena themselves. In chapter eight he reviews magnetism and indicates the units connected therewith, continuing the investigation into electro-magnetism in chapter nine. He discusses in chapter ten induction and the units which are applied thereto, and makes in chapter eleven comparison between the electro-static and electro-dynamic units; then, after having explained in chapter twelve the British Association units, he indicates the means of measuring by their aid electrical quantities. Lastly, he shows, in chapter thirteen, how one can determine experimentally the absolute unit of resistance. In completing this work, M. Blavier gives, in a note, the mathematical theory of electro-static phenomena.

It would be difficult to say just to what point the formulæ indicated in this work are applicable in practice, and as to that which pertains to the construction of electro-magnetic apparatus in their maximum conditions, we believe that formulæ based on simple algebraical calculations would be more useful for constructors, but the plan of this work, as carried out, presents a homogeneity and co-ordination which is very remarkable, and should satisfy the theorists. To give an idea of the facts and deductions which are united in this volume, it will suffice for us to say that it contains 452 paragraphs. It will certainly form a very useful adjunct to the English work of Clerk-Maxwell on Electricity and Magnetism.

We profit by this opportunity to quote some re-

marks on the use of the word *potential*, which is often misused lately. (The word *potential* was introduced for the first time into electric science by Mr. George Green, of Nottingham, England.)

"The electric *potential*," says M. Blavier, "is a special quality of electricity which corresponds to the elastic force of gases, to the hydrostatic pressure of liquids, and to the temperature of bodies in the theory of heat. It is in virtue of the difference of potentials of two points that electricity is transmitted from one to the other. If two bodies have the same potential there will be no movement of electricity when they are connected by a conducting wire. Potential is essentially distinct from the density of the electricity on the surface of conductors, and from the pressure or tension that the electric fluid exercises between separated bodies. Thus, although the electrical density may be unequal at divers points of an ellipsoid, if it is put in communication with a metallic ball by means of a long conducting wire, the ball always takes the same charge, whatever point of the ellipsoid may be touched. One may define potential as being a mathematical expression of which the value in each point of space is equal to the sum of the ratios that are obtained by dividing the diverse electrical masses contained in that space by their distance from the point considered." These definitions show that it is wrong to abuse the word *potential* when the electrical state to which it is applied is not in the conditions described by that designation.

On the Electro-Motive Force of the Voltaic Arc.

M. LA ROUX has lately presented to the Academy of Sciences a note tending to demonstrate that the electro-motive force determined in the voltaic arc is the result of a thermo-electric phenomenon, in which the carbon would be positive with respect to its vapor, serving as a vehicle for the current, and in a degree increasing with the temperature. He says, "when an electric flux is established between two conductors of the same nature, by means of a gaseous medium, which is ordinarily the vapor emitted by their substance, the inequality of temperature of the portions of these conductors, which are contiguous to this medium, appears to be a general fact. It seems not less general that the extremity by which the positive electricity arrives possesses the highest temperature. This is observed in a very remarkable degree at the time of the production of the voltaic arc between two carbons by means of a current of constant direction such as proceeds from a battery.

The idea of attributing a thermo-electric origin to this phenomenon is already old; it is to be found mentioned in the works of Verdet. According to the application of the principle of the equivalence of heat to the electrical phenomena, resulting from the investigations of Messrs. Helmholtz, Clausius and Thomson; to a production of heat at the point of junction of two heterogeneous substances, there corresponds an electro-motive force acting in the contrary direction to the current. M. Edlund had remarked some time ago that the hypothesis of the resistance of the voltaic arc, considered simply as a conductor, did not suffice to account for the diminution in intensity suffered by the current of the battery. Quite recently M. Joubert, in the course of his interesting researches in magneto-electric machines, has come to the conclusion that the resistance of the arc is very feeble, and the difference of potential which exists between the carbons was due, in great measure, to an electro-motive force resulting from a phenomenon of polarization. I have had besides in 1867-1868 to try again the experiments of Wartman, who shows that if we sus-

pend during an appreciable fraction of a second, even 1-70, the passage of the current, one can, in re-establishing it, see the arc reproduce itself without having to bring the carbons in contact; a fact which is explained very well, if we remember that the vapor of carbon, which, I think, principally constitutes the arc, can persist during some time after the cessation of the current, and as long as the heated gases which surround the carbons are conductors, as has been demonstrated by M. Ed. Becquerel.

It being admitted that from the passage of the current there results a difference of potential between the two carbons, this difference ought to subsist a certain time after the current has ceased, and at the moment there remains between the still heated carbons a conducting medium, one ought to be able to detect, by means of a galvanometer, this difference of potential. I had previously endeavored to demonstrate its existence by means of a sort of double interrupting wheel, analogous to that which I had employed to make the current from a battery pass by intermissions between two lamps, but this sort of apparatus gives rise to special difficulties.

It appeared to me to be better to employ only a single contact operated by hand, after the interruption of the current from the generator. With a galvanometer of great resistance, one can in this manner, even 2-10 of a second after the cessation of the current, demonstrate the existence of this electro-motive force in an inverse direction. One can succeed with a distance of several millimetres between the carbons, but the effects are more marked as the arc is shorter at the moment of the cessation of the principal current. The experiment succeeds equally well in the air or in the vacuum produced by ordinary air-pumps, and is also produced by two pieces of platinum.

[From *La Lumière Electrique*.]

On Causes Disturbing Telephonic Transmission.

M. DU MONCEL has noticed in the several editions of his work on the telephone, certain effects of transmission of telephonic sounds, caused by taps or scratchings on the conducting wires of the telephonic circuits (see page 138, first edition), and concludes "that some of the noises that one hears in telephones when tried on telegraph lines may undoubtedly proceed from friction between the wires and their supports, a friction which gives rise to the sounds, often very intense, that one hears sometimes on certain telegraph lines." But he has especially insisted on the sounds resulting from percussion exercised on a magnet, effects studied under different conditions by M. Desportes (see page 134). On the other hand, we should recall that M. Ader was able, as we have shown in the number of July 15, 1880, of this Journal, to reproduce speech, without the use of a battery, by the influence of shocks produced on iron wire, by the means of a telephonic diaphragm.

These experiments, notwithstanding their great interest, have not arrested the attention of the public. Nevertheless M. Gaiffe, in a communication lately made to the Academy, has occupied himself somewhat with these effects, for he shows that in adapting to the conductor of a telephonic circuit (the latter being flexible so as to avoid the mechanical transmission of sound) a rod of iron of 1½ yards length, it is sufficient to strike this rod either longitudinally or transversely to its length, to produce sounds which are transmitted, with all of their distinctive characteristics to a telephone joined to this conductor.

He shows besides that these sounds are peculiar to iron, for with rods of copper and brass, no effect

produced. Mr. Hughes' experiments could probably indicate the cause of these effects. We do not believe they can prevent telephony to long distances, for with telephonic system of M. Herz it has been possible to correspond at great distances without energetic electrical action.

Referring to this subject, *l'Electricité* contains the following from M. Gaiffe:

"In the note which you have been good enough to publish in your journal, and which I have communicated to the Academy on March 28th, I have stated that currents of electricity manifest themselves in a rod of iron put in vibration by shocks or blows.

The following experiment seems to indicate that these currents may be produced by induction. Two rods of equal length have been cut from the same piece of steel susceptible of being strongly polarized without being tempered; one of these rods has been magnetized to saturation and both of them then placed in a telephonic circuit in the manner described in the note of March 28th. In striking them in succession in the same manner, it was noticed that the bar strongly magnetized gave energetic currents, whilst the other gave relatively very little. I find a perfectly satisfactory explanation of this phenomenon in the theory of Ampere. There should be produced in the magnet in vibration currents analogous to the extra currents produced in a helix in which the respective positions of the spirals are modified by vibration.

Units of Electrical Measurement.

THE International Congress of Electricians, to be held in Paris during the summer, will doubtless be called upon to consider the subject of a uniform standard for electrical measurements. The system of standards at present most used was adopted by the British Association after eight years of study and experiment by a committee. In it all the units of measurement are referred to three fundamental units, the centimetre, the gramme, and the second, whence it is called the centimetre-gramme-second system of units (expressed by the symbol C. G. S.). The units practically employed—multiples or sub-multiples of the fundamental units—are the *ohm*, or unit of resistance (symbol R.), the *volt*, or unit of electro-motive force (symbol E.), and the *weber*, or unit of intensity (symbol I.). Their relation to each other is expressed by the equation, $I = \frac{E}{R}$,

whence, the value of two of the elements being known, that of the other two can be determined. The unit of resistance, or ohm, is determined by a long and complicated formula, so that it is easier to get it at once by comparison with the material standard which is kept at London. Graduated resistance boxes containing electric coils carefully adjusted to the resistance-force they are intended to represent, are sold by the instrument-makers. Some idea of what the ohm is may be given by saying that a wire of pure copper a metre (or 39½ inches) long and a millimeter in diameter (or about twenty-fifth of an inch) represents a resistance of one-fiftieth of an ohm; consequently, fifty metres, or one hundred and fifty and a half feet, of such wire will represent an ohm. Common copper wire offers a stronger resistance, so that only thirty or forty metres of it are required to represent an ohm. The volt, or unit of electro-motive force, is not represented by any actual exact standard, but several constant piles exist, the force of which has been exactly measured, which may be referred to. A Daniell battery, having its copper immersed in a saturated solution of sulphate of copper, and its zinc in a saturated solution of sulphate of zinc, has a force of

1-079 volt. The electro-motive force may be measured in practice by using galvanometers which are graduated in volts, the exactness of which is proportioned to the amount of the resistance they offer. One weber represents the intensity of a current having a force of a volt and passing over a circuit which offers an ohm of resistance. The intensities of currents in ordinary industrial use are represented by fractional units of the weber, the *milliweber*, or thousandth of a weber, for telegraphic, domestic, and medical currents, the *microweber*, or millionth of a weber, for telephonic currents. Telegraphic currents vary in intensity from five to twenty milliwebers; the currents of the Gramme machines that feed the Serrin regulators, of from twenty to thirty webers. Some machines used in electrotyping afford still more intense currents, often exceeding eighty webers, although their electro-motive force is very feeble. In France they sometimes measure by the kilometre of resistance, meaning by that the resistance which is offered by a telegraphic wire four millimetres, or about one-sixth of an inch, in diameter, and a thousand metres or five furlongs long—which is equivalent to about ten ohms. The unit of Siemens (U. S.), employed in Germany, represents the elastic resistance of a column of mercury having the length of a metre and a section of a square millimetre, and is equivalent to 0.9536 of an ohm. Several units of intensity founded on the chemical action of electric currents are in use—such, for example, as may be founded on the quantity of gases disengaged in a minute by a voltmeter placed in a circuit, or the amount of copper that may be deposited in an hour in an electrolytic bath which is traversed by the current to be measured. Standard apparatuses have also been made, so graduated as to furnish on a simple reading the intensities in webers and microwebers.

Arctic Exploration and Telegraphy.

REFERRING to the article upon this subject published in the JOURNAL OF THE TELEGRAPH of May 16, Mr. George Kennan, a gentleman who was connected with the "Russian extension" telegraph expedition, and who is a well known writer on Siberian travels, writes as follows to the New York Herald:

"Wide circulation has recently been given in the newspapers to a suggestion made by Mr. James Gamble, superintendent of the Western Union Telegraph lines on the Pacific coast, that the electric telegraph be used to maintain communication between Arctic sledge parties and their base of supplies. Mr. Gamble proposes that each party be equipped with a quantity of light steel wire, weighing twenty pounds to the mile, to be unreel on the snow from a moving sledge just as a cable is laid from an ocean steamer. By means of this wire, with telephones or Morse instruments at the ends, he proposes to keep a sledge party in constant communication with its ship or base of supplies. From a telegrapher's point of view this scheme would appear to be entirely practicable. A line of wire, once laid as suggested, over ice or snow, could undoubtedly be worked successfully. But Mr. Gamble does not, I think, take into consideration the peculiar difficulties which would arise in an Arctic region from the nature of the climate and the inadequacy of all existing means of transportation. An Arctic sledge party starts out late in the winter or early in the spring, when the thermometer ranges from zero to fifty degrees below (Fahrenheit). It is, to say the least, very doubtful whether a steel wire of No. 20 gauge could be unreel from a sledge in a temperature of 50 degrees without snapping at every turn of the reel. Admitting, however, for the sake

of argument, that wire could be laid and splices made in temperatures which render metals almost as brittle as glass, there still remains the pertinent inquiry, 'How would you carry wire enough to be of any use without crippling your party by curtailing its supply of food?' It is and should be the aim of every Arctic sledge party to extend the field of its exploration as far as possible from its base of supplies. In order to do this it must carry the largest possible quantity of food and the smallest possible quantity of camp equipage and baggage. The extreme capacity of a ten-dog sledge is about a thousand pounds. If this capacity be entirely given up to food the sledge can remain in the field thirty-five or forty days, and travel (on land) from six hundred to a thousand miles, according to the condition of the snow. Just in proportion, however, as you substitute camp equipage or telegraph wire or dead weight of any kind for food in making up your sledge load you shorten the time that you can remain in the field and the distance you can cover. One mile of such wire as that suggested by Mr. Gamble is just equivalent in weight to a day's supply of food for a team of ten dogs. If you leave the wire and take the food you can make a day's journey more; if you leave the food and take the wire you will make a day's journey less. In other words, for every mile of wire carried twenty pounds of food which might otherwise be taken must be left behind, and twenty-five or thirty miles of distance which might otherwise be made must be left untravelled. I think even the author of the suggestion under consideration must admit that twenty-five or thirty miles' decrease in distance travelled for every mile of wire carried is a high price to pay for telegraphic communication. If it were possible for an Arctic expedition to obtain an outfit of twenty or thirty sledges and two or three hundred dogs of course a hundred miles of wire might be carried with less proportionate sacrifice of other things. But this is not practicable. I understand that Lieutenant Berry does not expect to take more than twenty-five dogs from Petropaulovski on the Rodgers. Twenty-five dogs could just draw over moderately rough ice 100 miles of Mr. Gamble's wire without any furs, camp equipage or food. It is to be hoped that the party in the field would find the telegraphic society of the party at the ship a satisfactory equivalent for table board, since they would have no other. But 100 miles of wire, even if it could be carried without sacrificing everything else, would be of very little use. A sledge party which does not get more than one hundred miles from its base of supplies must be either very timid or very unfortunate. Lieutenant McClintock, with a sledge party from the Resolute, in 1853 made a single journey of 1,200 miles. Lieutenant Mechem, from the same ship, exceeded a thousand miles, and Wrangell, in 1821-24, went repeatedly to distances of three hundred and four hundred miles from his base of supplies at Nizhni Kolymsk. Telegraphic wire enough to maintain communication with sledge parties at such distances as these would weigh from eight to twelve thousand pounds and would load down ten or fifteen sledges, to the exclusion of everything else. It is obvious that the game would not be worth the candle. I have not thought it necessary to refer to the accidents which might and probably would happen to a wire laid out over sea ice, such as breakages resulting from movements of the pack and "grounds" caused by the opening of lanes of water. The objection founded upon the inadequacy of existing transportation facilities is of itself fatal to Mr. Gamble's plan. His Arctic telegraph line is as impracticable as the "steam sledge" recently brought to the attention of the

Navy Department in connection with the search for the Jeannette.

WASHINGTON, May 22, 1881.

Electric Lights for the French Coast.

M. E. ALLARD, Director of the Central Light-house Service, has submitted to the French Minister of Public Works propositions for lighting the coasts of France with the electric light. He would begin by substituting the electric light for the present oil-lights in forty-two of the principal light-houses, and adding sound-signals in twenty of them. The mean range of visibility of the present oil-lights is twenty-two miles on the ocean coast and twenty-seven miles on the Mediterranean coast. Within these radii they can be depended upon as signals during one-half of the year; during the other half they are liable to be interfered with by unfavorable atmospheric conditions, so as to greatly reduce their radii of visibility. With electric lights having the powers that M. Allard proposes to apply, the period during which the penetrative power may be deficient will be reduced to sixty days, or one-sixth of the year on the ocean, and to twenty-four nights, or one-fifth, on the Mediterranean coast. The cost of the proposed changes is estimated at seven million francs, or eight million francs if sound-signals are also provided. It is believed that the cost of keeping up the light after the change is made will be several times less than that of maintaining the oil-lamps.

[From the Cincinnati Commercial.]

Iridium.—Its Use as an Electric Burner.

THERE are over five hundred men in this city studying and making experiments with electricity, with a special view of utilizing it as a light. The professors in the Cincinnati University are engaged at it, and are constantly visited by amateurs seeking information.

The great desideratum is a permanent burner—one that combines durability, economy, and a fixed focus. All materials heretofore used are rapidly consumed, thereby shifting the focus, and frequently crumbling away, so that the light goes out. Electric light can only be emitted from points only an eighth of an inch apart.

The experiments made with iridium by John Holland, of this city, have culminated in a discovery that secures that indestructible material—iridium—to use as a burner for the electric light. He has a piece of iridium weighing only seven and a half pennyweights burning a Maxim machine about two weeks, of ten hours per day, and there is no perceptible change in the metal, either in its structure or its chemical character. From all appearances it looks as though it would last a year. A burner of that size can be furnished at not to exceed eight dollars.

The light is a pure white, and steady. The focus is fixed, and no poisonous gases are emitted, as from carbons.

It is used for the negative or under burner thus far, but experiments encourage the hope that it can be used for both poles, or burners.

The iridium burner will be used on one of the lamps of the *Florentine* this week, so that the public can see it in operation, and in comparison with the carbon burners now in use. The carbon burner costs from seventeen cents each to \$1.50 each, the latter being made of burnt willow, and are manufactured in Paris. These burners last only from three to eight hours.

A permanent investment: Building competing telegraph lines.

Journal of the Telegraph.

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NEW YORK, JUNE 1, 1881.

Business Frank Revoked.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, May 27, 1881. }

BUSINESS Frank No. O 11, issued on account Wash, St. Louis, & Pacific R. R., is hereby revoked.

Managers will take it up on presentation and return to me for cancellation.

JNO. VAN HORNE.

Vice-President.

A New Electrical Society.

An electrical society is in process of formation in Spain, which makes in all six societies that are devoted to the study of progress of electricity. Those already in existence have their headquarters in London, Berlin, St. Petersburg, Chicago and New York. There should be included in this list the *Chambre Syndicale d'Electricité* of Paris, of which Mr. H. Fontaine is the President, founded rather for an industrial than a scientific object, to protect the interests of electrical manufacturers.

A New Electrical Journal.

We have received a copy of the first number of a new electrical periodical called *L'Electricien*, published at Paris semi-monthly. It is a handsome quarto of 65 pages; the typographical execution being excellent. The magazine is edited by a committee whose secretary is Mr. Hospitalier, the well-known electrical engineer. Among the contributors to the first number we notice the names of Messrs. Mercadier, Niaudet and Tissandier. A valuable feature is the summary of all electrical patents taken out in France. This number also contains what will be very valuable for reference on this side of the Atlantic, viz.: a supplement containing all of the official

documents relating to the Exposition of Electricity published from its first inception down to the present time. The rules and regulations governing exhibitors, blanks, forms of application, etc., are given in full.

Notice of Steamship Arrivals.

NOTICE of the arrival at New York of Steamers of European, West Indian, South American and domestic ports can be sent to any office of the W. U. Company in the United States at a cost of one dollar for the report and tolls on a message ordering the same and on a ten word reply giving the information, all of which must be prepaid or guaranteed. Steamers will usually be reported from three to five hours before their arrival at the wharf. Orders should be addressed to "Manager Marine Department," N. Y.

COL. THOMAS ALEXANDER SCOTT.

COL. THOMAS ALEXANDER SCOTT, who has long been regarded as the foremost Railway manager of his time, died at his country home, Woodburn, Pa., at nine o'clock, Saturday evening, May 21st, 1881. He was born in London, Pa., Dec. 28th, 1824, and was therefore less than fifty-six and a half years old when his remarkable life closed.

His education was derived only from the common school of his native village, and from his active business pursuits. While quite young he was employed in a country store, and, on the death of his father, became clerk of the Collector of Tolls at Columbia, Pa., then a transfer point of freight between the canals and the Columbia Railroad. His efficiency led to his promotion, in 1847, to the position of Chief Clerk of the Collector of Tolls on the State main line at Philadelphia. In 1850 he entered the services of the Pennsylvania Railroad Company as general agent of the Eastern Division, his office being at Duncansville. His great energy, intelligence and executive ability led to successive promotions, until 1858, when at the age of thirty-three, he was made General Superintendent of that already extensive corporation, and two years later, on the death of Vice-President Foster, he was elected Vice-President, to fill the vacancy. He became a master of the details of the whole business of transportation, and studied with great attention the vast interests of the country affected thereby, applying his knowledge with surprising judgment and vigor, until the corporation to which he devoted his life became one of the best, if not the very best, managed railway organization in the world, and it is now conducted upon the comprehensive plan and careful perfection of details which were in very large measure instituted by Col. Scott.

From the beginning of the war of the rebellion in the spring of 1861 until its close, Col. Scott rendered very valuable service to the Government, in maintaining railway communication and supplying facilities for transportation. He was appointed Colonel of the district of Columbia Volunteers in May, 1861, and in August of the same year was made Assistant Secretary of War, in which position he continued until June, 1862, when he resigned and returned to his duties as Vice-President of the Pennsylvania Railroad Company. His services were very highly appreciated by President Lincoln, Secretaries Cameron and Stanton, and other principal officials of the Government, both civil and military.

In June, 1874, Col. Scott was unanimously elected to the Presidency of the Pennsylvania Railroad

Company, which had been made vacant by the death of J. Edgar Thomson. He occupied this position with great credit until June 1, 1880, when he resigned, because of the assurance of his physicians that it was indispensable to a possible restoration of his health that he should be relieved from the cares and responsibilities of business. He had in the meantime occupied also the important positions of president of the Pennsylvania Company, operating the leased lines west of Pittsburgh; president of the Union Pacific Railway Company, March, '71, to March, '72, and president of the Atlantic and Pacific and the Texas Pacific Railway Companies.

The illness which finally occasioned the death of Col. Scott, it is believed, was in part attributable to an injury which he received in a railway accident in 1856, as since that time there has been a tendency to paralysis in his left side, always most apparent when he had been overworked, or ill from any cause. It can hardly be doubted that his exceedingly active and useful career was cut short by reason of the continued burden of vast business cares which he carried so resolutely. And, while the great results which he achieved both to the corporations that he served, and to the country, as well as the acquisition of great wealth, afford lessons and incentives which are worthy of emulation, and will, no doubt, influence the conduct of great numbers of young men in the years to come, towards increased activity, industry and usefulness, his early loss of health, and comparatively early death, warn us that excessive and continuous labor and care bring penalties for which even such noble results afford no adequate compensation, and suggest the exercise of care that health may be preserved.

The burial of Col. Scott was at Woodland Cemetery, Philadelphia, on Tuesday afternoon, May 24th. The ceremonies were simple and unostentatious, and were attended by a large number of railway officials and other of his personal friends.

LITERATURE.

Electric Lighting by Incandescence. By W. M. Sawyer. New York; D. Van Nostrand. 1881. Pp. 189. Price, \$2.00.

In these chapters Mr. Sawyer has given a *resumé* of the present condition of electric lighting by incandescence, describing the chief apparatus that has been so far devised. He begins his exposition with a consideration of the various electric generators, as these necessarily are at the foundation of any system of electric lighting. Of these the two important classes are those of the Gramme type, in which he includes those of Maxim and Brush; and those of the new Siemens type, in which he places his own and Edison's. The Wilde, De Meritens, and Lontin machines are also described, the first being characterized as the "germ of a perfect generator," in that in it the intensity of the magnetic field is uninfluenced by the resistance of the external circuit, and a larger part of the entire current can therefore be used than in accumulative machines. The review of incandescent lamps includes those of Starr and King, Lodyguine, Konn and Kosloff, Bouliguine, Fontaine, Farmer, Sawyer, Edison, and Maxim, in which the carbon is protected from the atmosphere, and those of Reynier and Werdermann, in which it burns in the air. Of the former, only the last three are regarded as practicable lamps, and of these the Maxim is considered as, in all essential particulars, a duplication of that of Edison. With regard to the duration of the carbon, Mr. Sawyer holds that the hope of making it permanent is chimerical, as no material will stand the strain to which an incandescent conductor is subjected, and that the part of wisdom, therefore, is to provide for its renewal. In treating of the division of the current,

four systems are considered—the series, the multiple, the multiple-series, and the series-multiple system. In the first, the lamps are strung one after the other upon one wire; in the second, each lamp is hung on a branch between two parallel wires; in the third, several lamps are placed upon a branch; and, in the last, groups or bunches of lamps are strung upon one wire. For a large number of lamps Mr. Sawyer considers the first arrangement impracticable, and the last, which he has adopted, the most desirable. Regarding the cost of incandescent lighting, the conclusion is reached that it is not more than one-seventh of that of gas for equal light, while the cost of plant, repairs, etc., will be much less. As to the future of incandescent lighting, and its relations to other forms of illumination, Mr. Sawyer expresses himself as follows: "The application of electricity to public and private illumination is a realization of the near future no longer to be questioned. It is not probable, however, that electricity will ever entirely supersede gas; indeed, it does not appear that illuminating gas has materially affected the consumption of illuminating oils. There is room, and will doubtless continue to be room, for all methods of artificial lighting, and it is not likely that, for many years to come, we shall witness anything more than the extensive use of electricity—public buildings and private residences, streets and squares better illuminated than at present, and the new form of light keeping pace with the progress of older and well-tried institutions."

THE publishing house of Dentu has just issued a charming little pamphlet, from the pen of M. P. Barrué, entitled, "*Edison at Home*." This lively and animated account of a visit to the home of the celebrated electrician is accompanied by a portrait of Edison, a design of the celebrated lamp which has excited so much attention, and an autograph of the author of the phonograph, whose handwriting, although correct and legible, has a great degree of originality, and would be worthy of being analyzed by adepts in the mysterious art of divining characters from the handwriting.

The Telegraph.

THE International Ocean Telegraph Company's 1873 cable, between Key West and Havana, was successfully repaired at 9.25 P. M., May 17th, thereby restoring telegraph communication with Havana and points south.

A LONDON contemporary illustrates the rapidity of telegraphic communication at the present time by mentioning that a message was dispatched from there to New York, by the Anglo-American system, and a reply returned and delivered within an hour. The message and the reply traversed a distance of more than 8,000 miles, and underwent two deliveries by hand in an hour.

[From *Electrotechnische Zeitschrift*.]
Cowper's Writing Telegraph.

THE writing telegraph of Cowper, which formerly required two wires, has been modified by M. Max Jülich, of Vienna, in a manner which permits the working of the instrument on a single wire. He avails himself of the fact that rapidly intermitting currents give to the needle of a galvanometer deviations which are fixed and without oscillations; although these deviations may be feeble than those produced by constant currents of the same strength.

He has used two discs analogous to the distributing discs of Mayer's quadruplex telegraph and moves them synchronously by the aid of clockwork, one at the sending and the other at the receiving station. These discs place the line wire alternately and at short intervals in communication with each one of the receiving galvanometers of the apparatus. At the same time the line is put in communication successively with each one of the rheostats of the transmitter.

The synchronism of these discs is maintained in a manner similar to that employed in the Hughes printer, by the sending of a correcting current once in a revolution of the discs.

Postal Telegraph Clerks.

A TELEGRAM from London, dated May 25th, to the New York *Herald*, says that in the House of Commons last evening Right Hon. Henry Fawcett, Postmaster-General, replying to an inquiry, said that both the Treasury and Post Office are now considering proposals which had been submitted to them in regard to the position of telegraph operators. He expressed his willingness to do what he could in their behalf. The London correspondent of the *Liverpool Courier* says that Right Hon. Henry Fawcett, Postmaster-General, recommends a provisional remodelling of telegraph operators' pay and working hours, but not a settlement of their status as civil service employés. This is likely to occasion discontent, but a strike cannot now be considered possible in view of Mr. Fawcett's friendly attitude.

Private information received here also indicates considerable discontent on the part of the operators in the British Postal Service, but that such measures looking to the improvement of their condition are likely to be adopted as will prove acceptable.

New Transmitter.

WE have had many enquiries in relation to an announcement made by us last week that we had seen and heard a new transmitter in which carbon was not employed. As this is a recent discovery, and the foreign patents have only just been applied for, it will be evident that very much cannot yet be said about it. We are at liberty, however, to say from personal examination that the material employed is harder than carbon and therefore more durable, that it is a better conductor than any other non-metallic body, carbon not excepted; and finally that it has the property possessed by carbon of varying conductivity with varying pressure, but in a much greater degree. From this it results that a very much better transmitter can be made, and we may add is made from the new substance than from carbon. The patentees are Messrs. David Mosely and Son, of Manchester.

Automatic Recording of Telephone Messages.

In a book on the application of the telephone and microphone to physiological and chemical uses, Dr. Boudet describes his method of automatic recording of telephone messages. To do this he removes the diaphragm of the Bell telephone, screws to the wood one end of a steel spring, the other end being opposite the pole of the magnet. To the free end he solders a small piece of soft iron, weighing one-tenth of a gramme. Attached to this piece, and in the prolongation of the axis of a spring, he fixes a light bamboo arm, ten centimetres long, and terminated by a needle of whalebone. In fact, the diaphragm is replaced by a movable armature resembling the interrupter of an induction coil. The tracings are made on smoked paper, and transferred to glass.

There are some points of difference, as well as resemblance, which make it probable that tracings of this kind may be deciphered, but the matter is in embryo yet.

Military Telegraphy in Tunis.

WE read in the *Alchbar*: Yesterday we announced that a numerous brigade of military telegraphists had arrived at Bone, equipped with considerable material and some electric lights.

The last messengers who have arrived at Bone and La Calle have brought a number of reels of cables for the telegraph in the Tunisian campaign, and also the apparatus for optical telegraphy both by day and night.

This optical telegraphy, which has undergone of late years so great a development, has the advantage of never being interrupted or cut by the enemy, for the communications need no wire, but rays of light, visible only in one particular direction. With the telegraph and the telephone the enemy can tap the wires and copy the message as it passes, but the optical telegraph suppresses this inconvenience. It is based on the well-known property of mirrors to reflect sunlight with an extreme intensity.

M. Leseurre has made experiments in Algeria by which he has sent, with a circle of 8 inches in diameter, to a distance of 50 miles, a flash of light almost too brilliant for the eye to bear.

The apparatus of Col. Mangin is used in the army in Tunis. It consists of a large box, of which the two halves are divided by a screen pierced by a hole. During the night a lamp, behind which is a reflector, concentrates its rays on a point determined. An obturator operated by a lever permits the operator to arrest the light and thus produce flashes short and long, corresponding to the dots and dashes of the Morse apparatus. A field-glass is used to find the corresponding station. In the day-time when the sun is bright, the solar rays are brought to the axis of the apparatus and the remainder is the same as with the lamp.

On the Tunisian frontier the optical telegraph will render valuable service, as from the nature of the country it will not always be possible to instal the telegraph wires in good conditions of insulation. If one fails the other can be used.

Miscellanea.

ELECTRICITY AS A MOTOR.

The New Machine in Berlin said to be Old in Principle.—Mr. Dickerson's Views.

MESSRS. Siemens and Halske, the well-known electricians, have just exhibited to the public, near Berlin, an electric motor for railway cars. As it is described in the cable despatches, this new electric railway, which runs between Litchterfelde and the Cadettenhaus, six miles from Berlin, is exactly like a narrow gauge railroad ordinarily used for steam cars. The rails, however, are insulated, and are connected with the two poles of a powerful electrodynamic machine at the station. Thus a current is sent through an electric machine upon the motor, and the power is converted into motion.

Mr. Edwin N. Dickerson, the lawyer of this city, who is a recognized authority on all matters pertaining to electrical experiments, said last evening, in relation to the newly announced electric railway of Siemens and Halske, that he had learned nothing of its mechanical details. "But it is nothing new, I am sure," he said. "As far back as 1837 I remember I first saw an electric motor, which was exhibited by Davenport & Cook, running upon a circular

track. Before 1840 Jacobi built one to run a small vessel. Prof. Page built an electric engine at Washington twenty-five years ago, and it was run for a while on the Baltimore and Ohio Railroad, to illustrate the application of electricity to such purposes. Congress appropriated \$20,000 to assist Prof. Page in his experiments. In that machine the electricity was generated from some sort of galvanic battery—probably Grove's.

"Up to that time," said Mr. Dickerson, "there was no very certain knowledge of the cost of generating power by electricity, but in recent years it has been found that the cheapest way is to generate dynamic energy by a steam engine, and so long as this is the case an electrical engine can never be run with as little cost as a steam engine.

"The first attempts were with a galvanic battery, and were very expensive. Afterward came the dynamo machines. Of course, on a railroad the steam generator of electricity cannot be carried. The steam engines must be stationary upon the ground, and either the rails themselves or two copper wires stretched along the rails may be made to act as conductors. Then by means of an electric engine power and speed may be attained without difficulty, the current passing from the rails by means of the insulated wheels of the engine.

"But an electric engine has been as possible any time within fifty years back as it is now, and, indeed, machines on the electro-dynamic principle have been in existence and in operation for many years.

"Siemens is an able and ingenious electrician, one of the best in Europe, and is the inventor of the Siemens armature, which he is no doubt using in this new machine. Halske is also well-known, and is a first-rate electrician. But they cannot possibly, in their invention, have materially differed in principle from a variety of well-known machines.

"In a word, the whole problem is one of economy. Since 1832 machines have been made for converting electrical energy into dynamic energy as, in other words, into horse power. A galvanic battery, let alone its expensiveness, can never be made constant. It runs down, and must be replenished. The dynamo electric remedied this defect. But to generate electricity by steam power, and again convert the electricity into motion, necessarily entails a loss of power, and cannot be done, as is plainly enough seen, as cheaply as the steam power could be applied directly to the wheels of the motor. The best plan, probably for an electric motor, is upon the method of Gramme's machine, Siemen's armature being used.

"As I said before, there is nothing at all impracticable in this thing, but it can never be as cheap as steam power. It is clearly possible, however, that the cost of steam power might be greatly economized, and great quantities of electricity might be generated in one batch, so to speak, so that in cities the advantages of being rid of smoke and other such nuisances might quite compensate for the loss in the cost of power. Electricity is sure to be used largely, too, where but small power is required, and consumers can afford to pay five times as much in proportion to the cost of steam, simply to be rid of the care of a steam engine. Whatever is new in any of these inventions is in minute details that will not materially alter the economy of them."—N. Y. *Sta.*

Improved Electric Motor.

A new form of dynamo-machine has recently been devised by Mr. C. F. Heinrich, which the *Telegraphic Journal* pronounces an important advance upon previous constructions. The main improvement is in the form of the armature, which the inventor

has been led to adopt by a careful study of the Gramme ring and the way in which currents are induced in it. He finds that the inner side of the ring (that farthest from the field magnet) produces on the coil a current opposed to the one induced on the part of the coil immediately in front of the poles of this magnet, and to this extent weakens the current and causes heat in the coil. When the field magnet is powerful and the ring thin, this effect is reduced, but the inductive action of the farther side of the ring is not wholly eliminated. He therefore makes the ring channeled, or of horseshoe cross-section, the coils of wire being wound on the outside only. This removes the metal from the inner portion, and at the same time allows such a free circulation of air around the wires of the coil where they cross the base of the horseshoe that heating is effectually prevented. The ring is mounted and revolved between the poles of the field magnet in the same way as on the Gramme machine.

The New York Electrical Society.—Sixth Regular Meeting.

THE sixth regular meeting of the New York Electrical Society was held in its rooms, Cooper Union, on Thursday evening, 19th ult. Twenty new names were added to the roll of membership. On motion of Mr. C. H. S. Small, seconded by Mr. E. C. Cockey, the Hon. Geo. Walker, U. S. Consul to France, was unanimously elected an Honorary Member, and the secretary was directed to request Mr. Walker to act as representative of the society at the forthcoming Electrical Exposition in Paris.

It was also resolved to discontinue the meetings of the society after the next regular meeting on 2d of June, until the first Thursday in October. Professor Vandeweyde, Vice-President of the Society, gave a deeply interesting lecture on Molecular Motion and Radiant Energy, illustrating with a variety of apparatus. His efforts were particularly directed to familiarize the minds of the members with the infinite smallness and numerical proportions of molecules. In this his success was very marked, and his happy manner called out almost continuous applause. President F. W. Jones called attention to the "Little Giant" of Faure, and gave several black-board illustrations of the rise and progress of secondary batteries from Ritter down to Faure. After a very animated discussion of the subject the Society adjourned. At the next meeting, June 2d, the Society is promised a very interesting exhibition of a secondary battery by Mr. G. A. Hamilton, the well-known electrician, also a new style electric date stamp and other novelties.

Society of Telegraph Engineers.

At the meeting of the Society of Telegraph Engineers in London, on April 21, Mr. St. George Lane Fox read a paper on the application of electricity to lighting and heating for domestic purposes. He explained his invention, which is practically the making of a fibre or series of fibres incandescent. He said that before long electricity would be applied to many domestic purposes, especially those of lighting and heating. Electricity itself might be compared to a very subtle gas or vapor, capable of being compressed by the application of force, and again capable of extending itself when the force was removed. This electrical force had been called by various names; he preferred, in order to simplify the subject, to use the expression electric pressure. Whatever might be the actual nature of electricity, it must be regarded primarily as a medium for the transmission of power or energy, and he proposed to show that it would be an exceedingly convenient and economical medium. There were certain points

about which there could now be no difference of opinion, and among these were the indestructibility of force or energy, so that when there was any translation of one form of force into another or several others there was never any real loss. Another point, and a more technical one, was that, as electricity flowed through a conductor the resistance offered to its passage in any part was proportional to the energy required to overcome that resistance, so that if the current passed through the conducting wires to an electric lamp, and thence through the lamp itself, the energy developed by the whole circuit was equal to the sum of the resistance of the lamp and the conducting wires; so that if the resistance of the conductors was nine times less than the resistance of the lamp the energy absorbed by them would be only one-tenth of the whole. With these simple facts he was prepared to show that electric lamps could be worked in indefinitely large numbers from central stations with a proportional cost of working. In describing his system of distribution he explained that it was somewhat similar to the gas distributing system. Main conductors passed from central stations, and branched in various directions; in these conductors electricity was forced so as to maintain them at a constant electrical pressure above the earth; and the lamps, being connected between the mains and the earth, would allow a current to pass through them depending on their resistance and the electrical pressure of the mains. This pressure being always the same, and the resistance of the lamps when in action being always the same, they would always give an equal amount of light.

A New Electrical Alarm.

THE *Vienna Technologische Blätter* describes a new electrical alarm to give warning of the danger produced by the escape of illuminating gas in theatres, shops, dwelling-houses, etc. The advantage claimed for it is that it gives warning before the fire or explosion consequent on contact between the mixed air and gas and a light can take place. A box ten inches in diameter and five inches deep, is closed in front by a porous earthen diaphragm, while the lower portion is surrounded by a curved tube of glass containing mercury, and pierced with a small hole to admit the external air. Two wires lead respectively to the battery and a vibrating bell, and in the box to the mercury and the contact point. The earthen cover has the property of absorbing very rapidly illuminating gas, which, penetrating into the cavity of the alarm, augments the volume of imprisoned air, causes the mercury to close the circuit, and thus gives the alarm.

BORN.

ROBINSON.—May 23, 1881, to J. F. ROBINSON, Manager W. U. Tel. Co., and agent I. B. & W. R. R. Co., at Downs, Ill., a daughter.

MARRIED.

JONES—KENNEDY.—At the residence of Wm. Walton, Clyde, N. Y., Wednesday evening, May 18, 1881, by the Rev. Mr. Reddy, of Syracuse, N. Y., C. E. JONES, book-keeper of the Clyde Glass Works, to Miss MARY L. KENNEDY, of Chittenango, N. Y., and for the last six years operator for the N. Y. C. R. R. at Clyde, N. Y.

STEWART—KEEFE.—At the residence of the bride's mother, at San José, Cal., WM. STEWART, manager W. U. Tel. Co., Redwood City, Cal., to Miss MARY C. KEEFE.

DIED.

MURRY.—At Kinross, Pa., May 13, after a brief illness of eleven days, "DANA ROSS," second son of Dan Murry, operator and lineman W. U. Tel. Co.

TURNER.—At Americus, Ga., JOHN W. TURNER, only son of John W. Turner, manager W. U. Tel. Co.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, June 1, 1881.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

Unless otherwise stated, all changes given below will take effect June 1, 1881.

GENERAL INFORMATION.

ALABAMA.

267 Lafayette is now * Lafayette, 25 2 Opelika. S.

ARIZONA.

Messages for all other line offices in Arizona will be sent and checked via Maricopa Wells only. "Tariff for other lines" from Maricopa Wells is given in Tariff Book and Supplement.

ARKANSAS.

391 Jacksonport, closed.
401 Judsonia, closed. S.

CALIFORNIA.

* Adams Springs, reopened; 50 3 Colusa. S.
* Allen Springs, reopened as * Allen Springs; 50 3 Colusa. S.
Ceres, reopened. S.
Lompoc, closed.
Dos Palmas, reopened. S.
* Meridian, reopened; 40 3 Colusa. S.
Mission San Miguel, reopened. S.
* Middleton, reopened; 50 3 Colusa.
Noyo, reopened.
Plainsburg, closed. S.
Santa Monica, reopened.

DISTRICT OF COLUMBIA.

Business for * * U. S. Navy Yard, given under Washington in Tariff Book, now free from Washington. a.

GEORGIA.

* Louisville, (H. R.) reopened; 25 1 Bartow. Erase the rate and route via Wadley. S.

INDIANA.

* * Dale is now a Western Union office. Square 300. S.
272 Vernon, reopened. S.

IOWA.

454 Ida should read 454 Ida Grove.

The following, at present other line offices, will be checked direct:

396 Albion.	396 Liscomb.
406 Chapin.	406 Mason City.
397 Coal Field.	397 Muchakinock.
407 Dillon.	407 Newburg.
396 Eldora.	407 New Sharon.
396 Faulkner.	406 Rockwell.
396 Geneva.	407 Searsboro.
407 Gilman.	406 Sheffield.
396 Hampton.	396 Steamboat Rock.
397 Hickory Grove.	396 Union.
407 Lacey.	

KENTUCKY.

233 South Covington changed to 233 Milldale. S.

MICHIGAN.

Marshfield, in last JOURNAL, is in square 250.
211 Romulus, closed. S.
240 Whites changed to 240 Wheatfield.

NEVADA.

Eagle Salt Works, closed. S.
Empire City, closed.
Steamboat Springs, closed.

NEW JERSEY.

* * Cranbury (given as Cranberry in Tariff Book) will be checked direct. Square 47. a.
52 Rockaway, reopened.

NEW MEXICO.

* Fort Craig closed.
Business for the following "other" line offices will be sent and checked only via Maricopa Wells, Arizona. Tariff for other lines from Maricopa Wells given herewith:
* Camp Bowie, 25 1. S. * Mesilla, 25 1. S.
* Fort Bayard, 25 1. * Ralston, 25 1. S.
* Fort Cummings, 25 1. S. * Shakespeare, 25 1. S.
* Fort McBee, 50 2. * Silver City, 25 1.

NEW YORK.

* Lake Minnewaska Mountain House, reopened 25 2 New Paltz or Rondout. S.
* Lake Mohonk Mountain House (given as Lake Mohonk in Tariff Book), reopened 25 2 New Paltz or Rondout.
Messages to the above named houses are frequently and in, correctly addressed to New Paltz. The Lake Mohonk M. H. is six and the Lake Minnewaska M. H. is ten miles from New Paltz. To reach the "houses" by telegraph, messages should have double check.
33 Bay Ridge, reopened. S.
33 Brighton Beach, reopened. S.
33 Glen Head, closed. S.
* * Hygienic Institute (given under Dansville in Tariff Book) is now 10 cents by telephone, from Dansville. a.
33 Manhattan Beach, reopened. S.
40 Palenville, reopened. S.

NORTH CAROLINA.

88 La Grange, reopened. S.

OHIO.

180 Arkona, changed to 180 Bittman. S.
170 Black Hand, given in Supplement, should read 170 Black Band, and is now open.S.

OREGON.

Willows, reopened.
The tariff for "other lines" to the following "other" line offices is now 40 3 from Portland. S.:
* Dallas. * Ray's Landing.
* Dayton. * Sheridan.
* Dundee. * Silverton.

PENNSYLVANIA.

66 Pond Creek P. O. is Zehner, Luzerne Co. S.

TEXAS.

* El Paso is now a Western Union office, square 830. S.
Until further notice the State rate to El Paso, Texas, will be the State rate to New Mexico.
* Winsboro, closed. Messages for Winsboro can be mailed from Pittsburg. S.

VERMONT.

38 Highgate Springs, reopened.
39 Lake Dunmore House, reopened.
39 Sudbury, reopened. S.

VIRGINIA.

* Three Mile Locks, closed. S.

WASHINGTON TERRITORY.

* Port Madison, closed.
Tenino, reopened.
White River, closed. S.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

ARKANSAS.

439 Rogers.

BRITISH COLUMBIA.

* Cowichan 50 3 Sumas.

CALIFORNIA.

Athlone.
Crescent Mills.
* Deadwood, 25 2 Cherokee.
Lancaster.
Westport, Mendocino Co.

ILLINOIS.

319 Bone Gap.
307 Pingree Grove.

INDIANA.

300 Ohandler.
300 Poseyville.
300 Stewartsville.

IOWA.

377 Crawfordsville.
367 Morley.
377 Mt. Union.
377 Roscoe.
346 Teeds Grove.

377 Winfield.
377 Yarmouth.

KENTUCKY.

233 Milldale. Tariff same as Covington, Ok. Covington.

MARYLAND.

85 Alesia.

MICHIGAN.

240 Wheatfield.

NEVADA.

Hawthorne.

NEW MEXICO.

633 Engle.
560 Peccos.

NEW YORK.

46 Brinckerhoff, (P. O. Brinckerhoffville.)
* Caryville, Genesee Co., 15 1 By telephone, Batavia.
40 Escopus.
74 Mapleton.
* Pine Hill, Genesee Co., 15 1 By telephone, Batavia.
37 Tilly Foster Mines, P. O. Care Brewster.

OHIO.

151 Goulds.
180 Bittman.

OREGON.

* Monmouth, 40 3 Portland.

PENNSYLVANIA.

* Hughesville, 15 1 By telephone, Halls.
130 Lakeville.
121 Punxsutawney.

WASHINGTON TERRITORY.

* Fort Townsend, (H. R.) 75 5 Seattle.
* Port Discovery, (H. R.) 100 7 Seattle.

WISCONSIN.

297 Pleasant Prairie.

CUBA CABLE.

The Cable between Santiago and Kingston, Jamaica, which was interrupted May 18, 1881, has been repaired. Communication with Havana, Cuba, was restored, May 18, 1881.

NORVIN GREEN,

President.

Transfer Service.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, May 27, 1881.

To all Transfer Agents and Offices:

On June 15th, 1881, Walla Walla, W. T., will be added to the list of transfer offices in Class B, and assigned to Frank Jaynes' district.

The transfer service has been resumed at Altoona, Pa., in S. S. Garwood's district.

NORVIN GREEN,

President.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

New York May, 28, 1881.

The payments for Assessments 140-141—levied April 1st, 1881, and on which membership, if unpaid, lapses May 31, 1881—of members holding certificates of the following numbers, have not yet been received by the Secretary:

ASSESSMENTS 140-141.

83 93 99 108 148 135 136 187 286 341 350 352 503 566 590 597 678
667 697 705 722 768 780 813 815 927 978 1000 1046 1071 1143 1161
1266 1587 1352 1368 1369 1421 1490 1516 1517 1518 1542 1556 1557
1570 1609 1613 1632 1663 1670 1707 1735 1745 1765 1799 1809 1849
1947 1969 1986 2021 2038 2048 2063 2110 2128 2145 2147 2151 2169
2216 2236 2262 2279 2281 2282 2283 2266 2273 2315 2386 2446 2472
2575 2578 2587 2595 2630 2640 2654 2664 2665 2697 2706 2737 2742
2765 2790 2799 2815 2849 2874 2889 2922 2932 3017 3039 3042 3044
3052 3067 3093 3124 3133 3134 3199 3203 3206 3239 3262 3274 3280
3299 3308 3336 3351 3354 3355 3358 3372 3374 3380 3390 3391 3397
3403 3412 3421 3425 3438 3440 3456 3457 3474 3475 3497 3509 3519
3526 3558 3574 3575 3577 3579 3580 3585 3588 3600 3621 3632 3636
3637 3653 3657 3700 3707 3708 3710 3725 3757 3764 3795 3812 3823
3834 3849 3850 3860 3862 3879 3902 3903 3921.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.**ASSESSMENT 143.**

NEW YORK, June 1, 1881.

HENRY A. MILES, JAMES NYE ASHLEY.

HENRY A. MILES died at Georgia, Vt., April 16th, 1881, of Pulmonary Consumption. His Certificate, No. 8824, was issued May 15, 1880.

The above claim will be paid from surplus.

JAMES NYE ASHLEY, died at Greenville, N. J., May 2d, 1881, of Pulmonary Congestion and Valvular Insufficiency. His Certificate, No. 2600, was issued March 6, 1876.

One Dollar is due to meet this assessment, from members holding Certificates up to and including No. 3976.

Insurance expires July 1st, 1881, membership, July 31st, 1881.

BY-LAWS—SECTION VIII. "Upon the death of a member of the Association, the Secretary shall levy an assessment of one dollar upon each surviving member, when directed so to do by the Executive Committee; and in case payment shall not be made within 30 days thereafter, the delinquent shall forfeit all claim to the benefits of the Association; and should payment not be made within 60 days, shall forfeit membership, to which said delinquent can only be restored as provided in Section VII. of these By-Laws."

N. B.—Members are hereby reminded that their insurance on Assessment 142 expired May 31st, 1881, and if payment be not made on or before the 30th of June, 1881, the membership will cease on the day last named.

SECOND DIVISION.**ASSESSMENT 3.**

NEW YORK, June 1, 1881.

JAMES NYE ASHLEY.

JAMES NYE ASHLEY died at Greenville, N. J., May 2d, 1881, of Pulmonary Congestion and Valvular Insufficiency. His certificate, No. 2, was issued January 15, 1880.

One Dollar is due to meet this assessment, from members holding Certificates up to and including No. 184.

Insurance expires July 1st, 1881, membership July 31st, 1881.

BY-LAWS—SECTION XXV. When official notice has been received of the death of a member in the Second Division, an assessment of one dollar shall be levied upon each surviving member of said Division, when so directed by the Executive Committee; and in case payment shall not be made within thirty days thereafter, the delinquent shall forfeit all claims to the benefits of the Division; and should payment not be made within 60 days, shall forfeit membership in said Division.

WATSON D. SOHRAM, Secretary.

The attention of members and agents is respectfully called to the above special notice in regard to Assessment 142, on which, in default of payment, the membership will expire on the 30th day of June, 1881; and agents who may have collected from members in their districts any dues on back assessments, for which they have not yet remitted, are hereby requested to make immediate return of the same.

The suggestion heretofore made to agents and which has been favorably and very generally responded to, the Secretary now desires to repeat, i. e., that all agents who can conveniently do so, would greatly facilitate the business and insure accuracy of the records of collections of assessments, and perhaps save them personally from some trouble, in replying to letters of inquiry from their members, if they will, on the first of each month, make a remittance covering the collections of outstanding assessments to date; and on, say the 10th of the month, a supplementary remittance covering any payments subsequently received by them. By the adoption of this plan but few, if any, numbers of certificates on which assessments may have been paid will appear in the list of delinquents printed in the JOURNAL OF THE TELEGRAPH.

An Experiment Showing the Cause of the Phenomena of the Photophone.

At a soirée of the Society of Electrical Engineers of London, held on April 11th, in the great hall of the College of the University of London, Mr. Preece executed an experiment designed to show that the phenomena of the photophone are really due to the action of heat. The following details will enable our

readers, who desire to do so, to repeat the experiment for themselves.

The light, which is preferably an oxyhydrogen lamp is placed before two lenses. In front of the lenses is placed a disc pierced with holes, through which the luminous rays pass. The rapidity with which the disc is rotated is such that the number of interruptions to the passage of the light is 100 per second. Another lens renders parallel the rays which have traversed the holes of the moving disc. These rays are then projected on a disc which can vibrate easily and which is placed in the anterior part of a box.

This diaphragm has behind it a cavity enclosing a certain quantity of air which contracts and dilates, and whose vibrations are communicated to the ear by the means of an india-rubber tube, placed at the posterior wall of the box. The experiments made by Mr. Preece proved that the disc produces a number of vibrations much inferior to the pitch of the sound that is heard, since it was, at most, only 4 or 5 per second.

As the number of vibrations in the gravest sound that can be heard by the human ear is much greater, it was natural to suppose that what was heard was not due to the vibrations of the diaphragm, but to the successive dilations and condensations of the mass of confined air.

This hypothesis was established on unshakable scientific bases by Mr. Preece. In fact, he proved that one could hear the sounds without the moveable disc, provided that one placed in front of the box a plate of glass or a lens which entirely closed it. Everything which augments the action of the heat on the imprisoned air augments the energy of the sounds. Thus they become more intense when the plate of glass is replaced by a plate of blackened metal, and when the interior of the box is blackened also. The latter observations have given rise to the construction by Mr. Preece of a new telephonic receiver. The general principle of the transmitter is this: a spiral of platinum is placed within a darkened cavity blackened on the inner surfaces, intermittent currents from a microphone and 4-bichromate cells are sent through the spiral. Articulate sounds are clearly rendered by the expansion and dilation of the mass of air when heated and cooled by the currents circulating in the platinum spiral.

Submarine Cables as Preventatives of Shipwreck

A CORRESPONDENT suggests an idea for preventing shipwrecks. It is stated that the storm of April 21st was, in the Frith of Forth, one of the most violent ever felt. It appears that seven ships, at the worst time during the storm, were saved from wreck by their anchors being caught in the submarine cables. This fact brings us to the proposition for the prevention of shipwrecks. It is to lay down metallic cords of a strength sufficient to resist the traction of our large ships, parallel to our most dangerous coast, and solidly maintained at a convenient depth. If these cables were properly placed and their positions indicated on marine charts, ships driven on the coast would have one more chance of salvation in case they were over a bottom of a kind where their anchors will not hold.

A New Product from Birch Bark.

A FRENCH inventor has patented a method of improving indiarubber and guttapercha by the addition of a distillate of birch bark. By distilling the outer layers of the bark he obtains a dense black gummy matter which possesses the properties of ordinary gutta percha, with the additional quality of resisting both the action of air and the strongest corrosive acids. He claims also that by adding a small proportion of the birch bark gum to guttapercha or to indiarubber (one twentieth part will suffice), the durability of the rubber or the gutta percha will be greatly increased, the new mixture not being acted upon by the air or by acids.

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Office Wire, Fuse, Leading and Connecting Wires,
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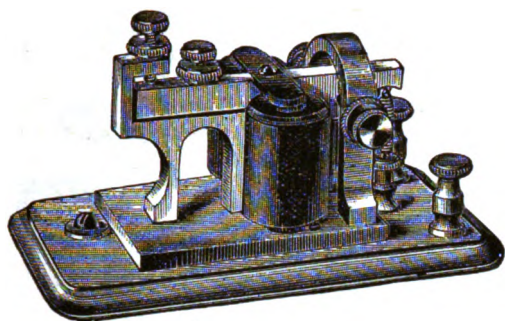
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THE ORIGINAL AND GENUINE
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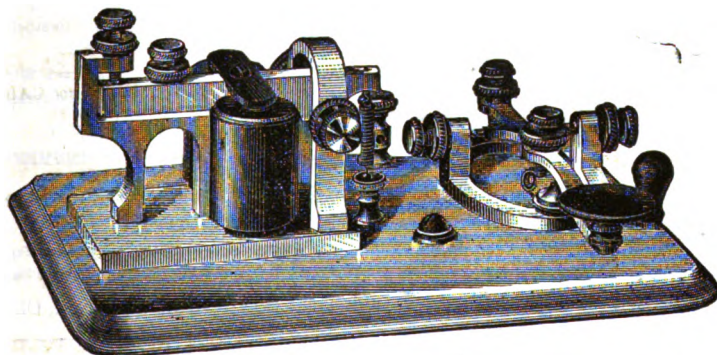
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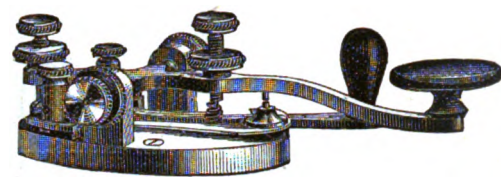
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COMBINATION SET.



For Private Wires, Main Lines, etc., up to 25 miles in length—Warranted—consists of our standard first-class Giant Sounder, finely finished, with Rubber-Covered Coils, fine Silk-Covered Wire, wound to 20 ohms resistance, mounted on Polished Mahogany Base, with a Steel Lever Key, making the prettiest and most perfect set of short Main Line Instruments ever produced. PRICE \$8.00, carefully boxed and sent by mail, prepaid, to any part of the United States.

J. H. BUNNELL & CO., 112 LIBERTY STREET, NEW YORK.



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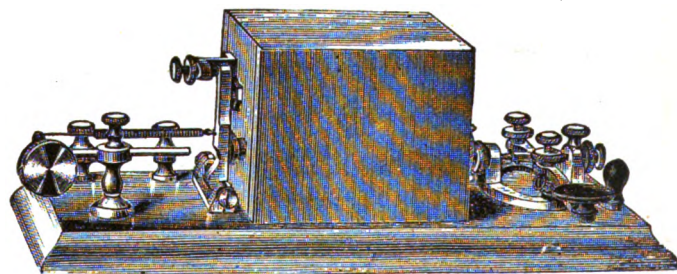
The same in all respects as our celebrated STEEL LEVER KEY, (which has become the accepted standard of perfection throughout the United States in less than six months' time since its first introduction) excepting that the base is made legless, or with "top connections." The entire key being handsomely finished, and making a beautiful and perfect instrument, suitable for use on fine desks or wherever a legless key is preferable. PRICE \$4.00, carefully boxed and sent by mail, prepaid, to any part of the U. S. Price of Regular Pattern (with legs), \$3.00.

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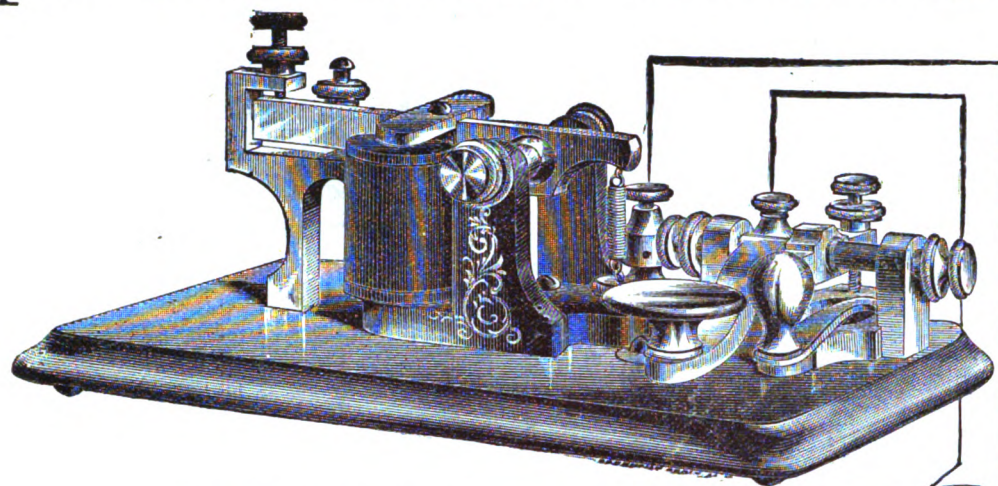
BOX SOUNDING RELAY & STEEL LEVER KEY,
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For Main Lines up to 600 miles in length. Of best construction for loud, ar sound without local sounder. Polished Mahogany Box and Base; 150 ohms Silk Wire. Price, with Steel Lever Key on base, \$12.00: without Key, \$9.00.

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THE BEST
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Price \$4.50, complete with Battery Book of Instruction, Wire, Chemicals, and all necessary materials for operating.

"Morse" Instrument, alone, without battery.....	\$3.80
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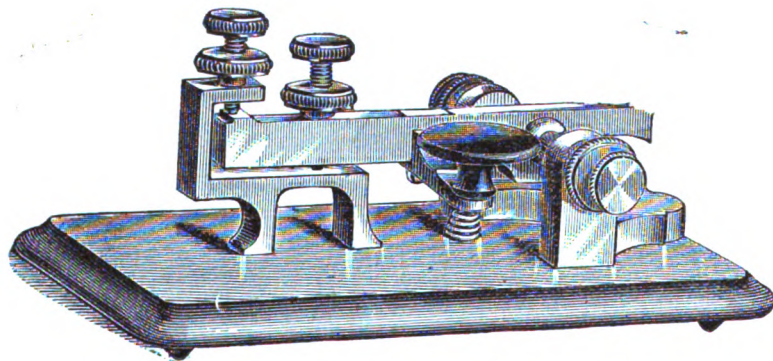
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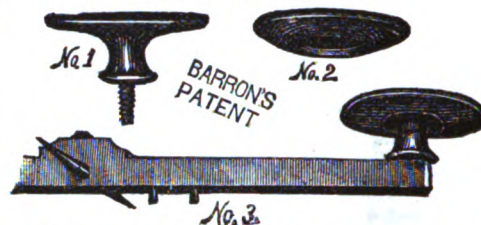
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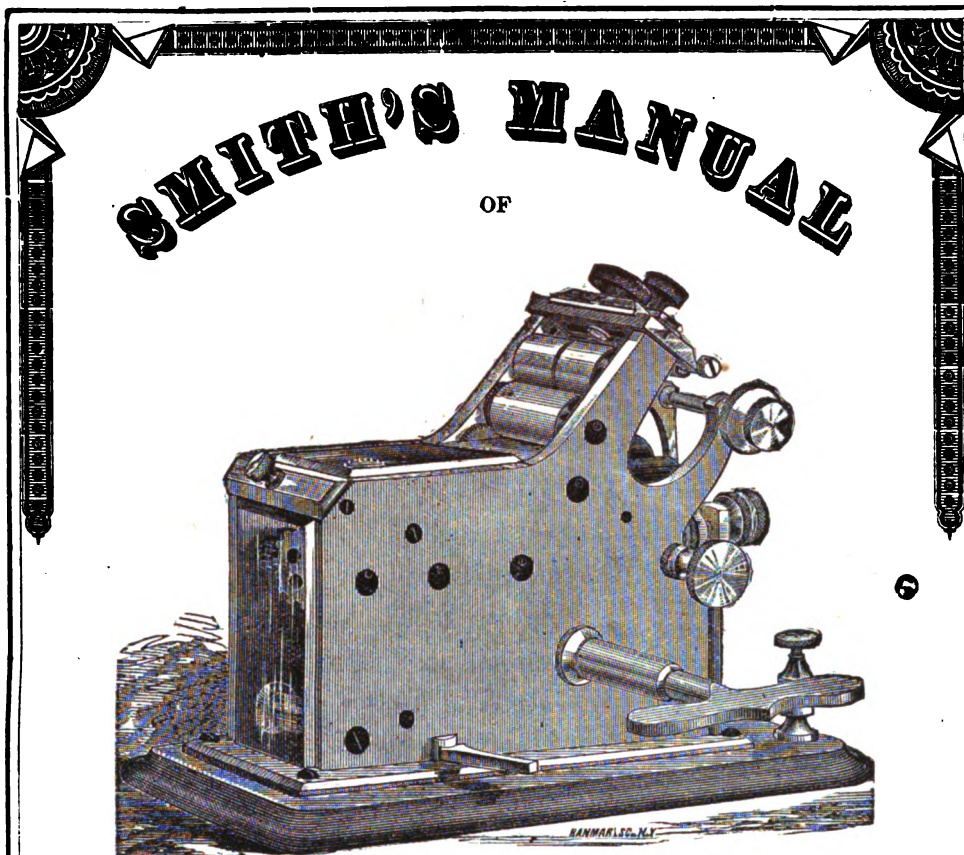
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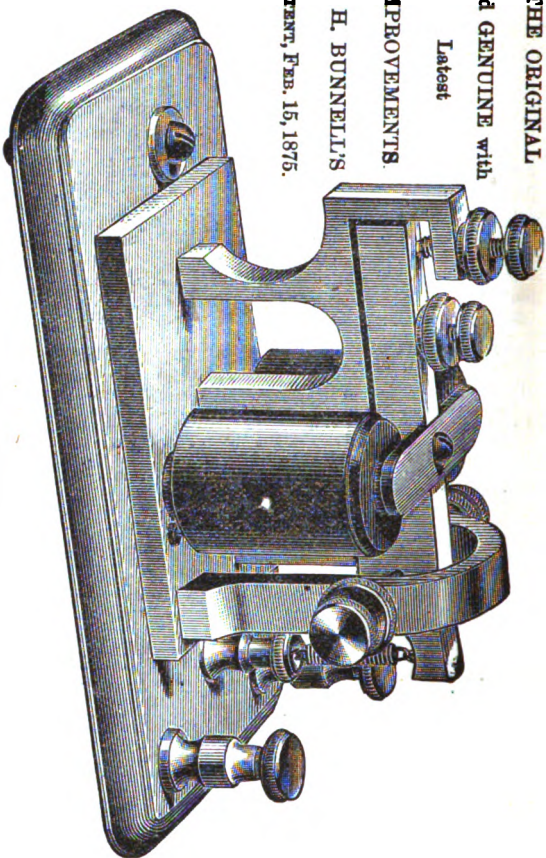
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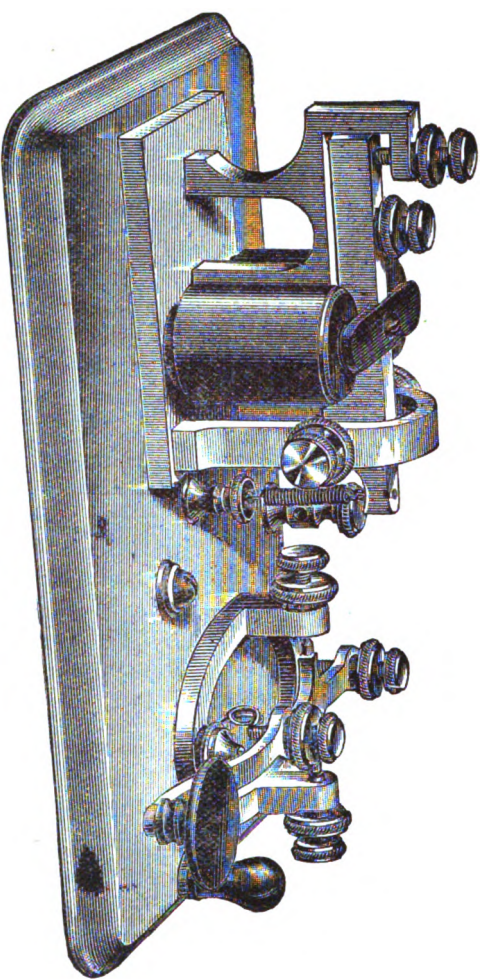
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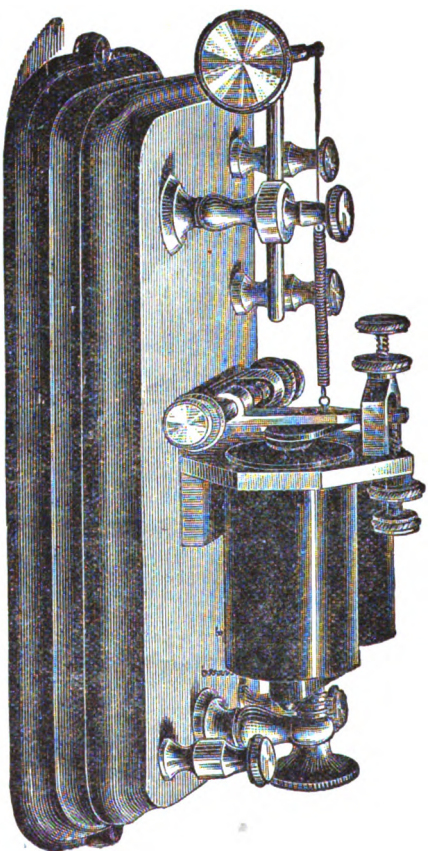
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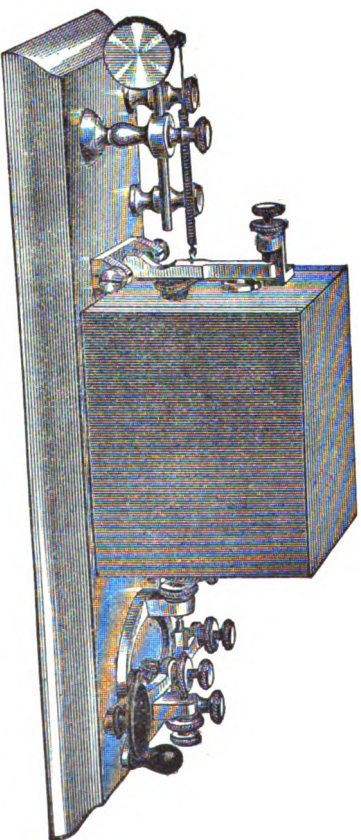
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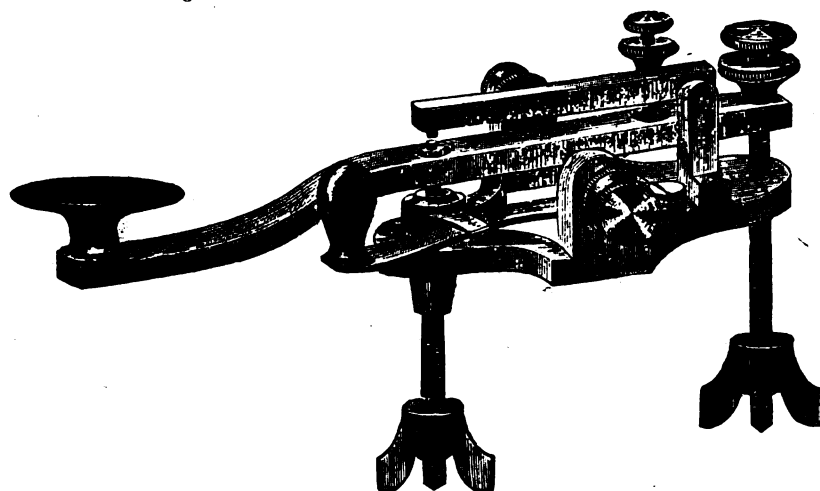
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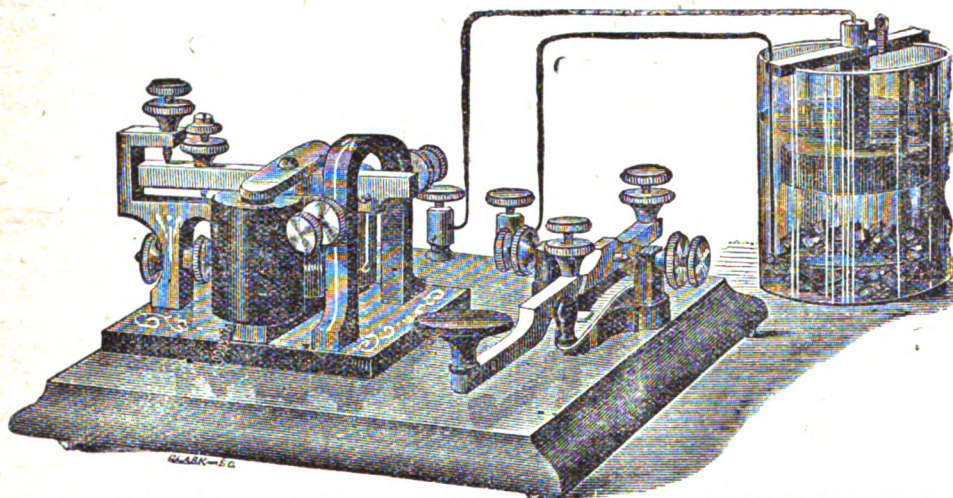


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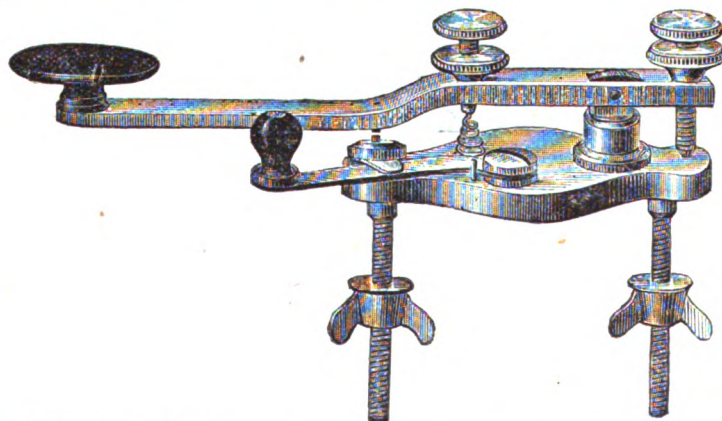
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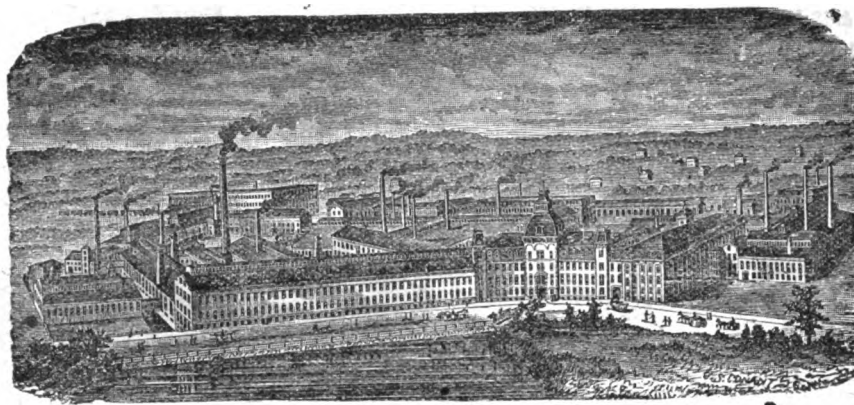
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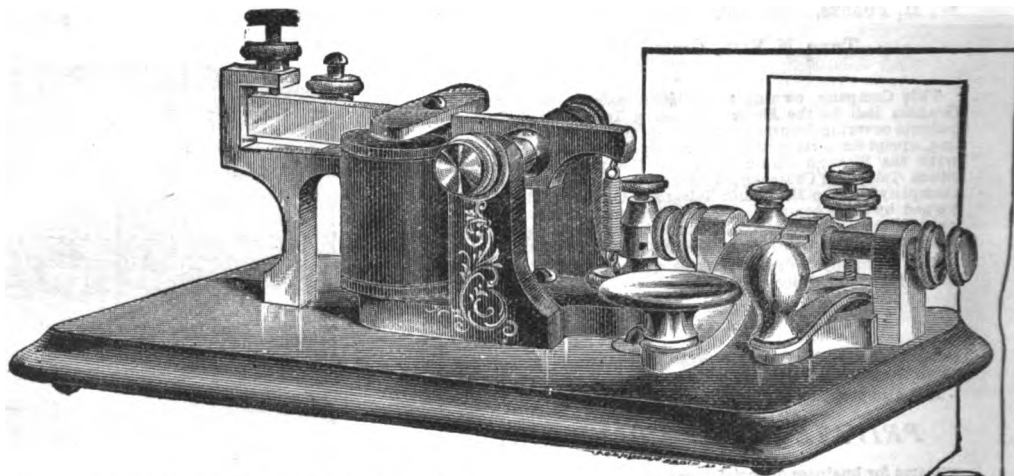
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JOURNAL OF THE TELEGRAPH.

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WHOLE NO. 333.

THE SCIENCE OF ELECTRIC LIGHTING.

By PROF. MAURICE KEIL, M.A., C.E.

I.

It is unquestionable that in this particular branch of electricity the names of Dr. W. Siemens, Edison, Jablochkoff, Gramme, and Hefner-Alteneck will, like the electric light itself, shine out prominently in future, and no matter what further improvements are in store before that process will be something like perfect, the above names will, nevertheless, be handed down to posterity.

I have taken up this subject not only on account of its importance, but especially to show the latest perfections and improvements accomplished, and the different bearings of these on the existing apparatus.

It is well known that everything was done here to prevent the burning of the carbon points by surrounding the same with atmospheric or nitrogen gas. This proved unsuccessful, as the carbon points, through the originating high temperature, if not actually burned away, nevertheless evaporated as gas. And it was seen, on closer inspection, and certainly after the lamps had been burning for some time, that the globes surrounding the light were covered with coal dust.

If we insert or direct a resisting force in the sphere of conduction of a galvanic current, a portion of the electric energy is converted into heat and light. Now, if we mark the current power with C , the electro-motor energy with E , the resisting force of the producer of electricity with r , and the resistance of the conduit with R , then, according to Ohm, we have the following relation :

$$C = \frac{E}{r + R}$$

If now it is required to make use of the heat which has originated in the sphere of conduction, then it is necessary to produce the same as perfect as possible in the resisting force R , as, for example, in the electric lamps. There are, therefore, losses of electricity to be prevented in the conducting wire and the machines, consequent on some opposing substance, therefore $R > 2$. For this purpose Ohm's law could be more nearer described

$$C = \frac{E}{R}$$

I may here remark, that with regard to the measurement of electro-motive force, that when the total resistance is known, and also the current generated, it is comparatively easy to determine the electro-motive force due to any generator by the formula $C + R = E$. Under conditions of unit measurements, volts and ohms, this gives us the force in volts. The electro-motive force must frequently be found, however, in cases where these figures are unknown. It is usually done in terms of some known standard of electro-motive force.

The resisting force, R , is formed best for the pur-

pose of the electric production of light through two pieces of carbon, by which means the voltaic arc of light originates. In order to make the use of the same for practical purposes, a mechanism is required which must keep the increasing distance of the carbon points, originating through the burning, in a constant position. Therefore have been, during the last few years, for this purpose, a large number of electric lamps constructed, and also different apparatus whose particular object is for producing motion by electricity, especially applicable to regulating the electro-motive force in systems of applying or distributing energy by electricity for lighting or other purposes.

In the lamps constructed recently by M. Hefner-Alteneck the two vertical carbon-holders approach each other by means of the weight of the top one. But, in order that by this arrangement the focus not be changed, the positive carbon at the top moves itself, which burns twice as quick as the negative one, also twice as quick towards the bottom as the negative towards the top. The carbon-holders are connected with a wheel-work, by which means the movements are regulated slower and more uniform. The required distance of the two carbon-points for the production of the arc of light is brought about in the lighting of the lamp through a succession of oscillatory movements of the anchor of the electro-magnet contained in the lamp, somewhat similar as in the electric bell. Through this anchor the wheel-work is also arrested. The regulation of the lamps is certainly very sensitive, but by exact arrangement the burning on the other hand is extraordinary steady.

It is not my purpose here to enumerate the different systems and lamps in use, but a cursory glance on the principal ones will, under the circumstances, not be out of place before I proceed to the main purpose of my article of illustrating the latest improvements made.

Undoubtedly in Germany the Siemens and Halske system ranks foremost. In England the Brush Company has almost entirely absorbed the field; certainly, the Swan lamps, in use at present at Newcastle-upon-Tyne, are also highly spoken of. The first-named company has a contract with the General Post Office, London, for lighting the whole structure with their electric light. Their arrangements are nearly complete, and the so-called newspaper room there was under official inspection a short time back. This room is a very large one, partially divided into two sections, and some hundreds of sorters are engaged in it. The former lighting was accomplished by four hundred and fifty gas jets, which raised the temperature of the room, as might well be expected, to 86° Fahr., and sometimes even above that. The temperature now, with sixteen electric lights, of 2,000 candle power each, has been reduced to 66° Fahr., and the diffusion of the stronger light was really excellent. The driving power of the magneto-machines is a small

Brotherhood engine developing about 15 or 16 horsepower, and the current machines are run at about 790 revolutions per minute.

Here Edison and the Brush Company occupy the field. Another monster Brush lamp will also shortly be in use, the first one answering every purpose. Its estimated light is not less than 100,000 candles. The carbons are 2.5 inches in diameter, and the motive power will be forty horse-power.

I may here remark in passing, that according to the researches of M. Jamin, the inverse electro-motive force of the electric arc presents a resistance to be first overcome; but with alternately contrary currents from a magneto-machine renewed at least 500 times per second, the current at each inversion profits momentarily by inverse force called forth during the previous emission; hence the possibility of lighting several arcs in the same circuit of a machine, and the number increases rapidly with the velocity.

(To be continued.)

The Comet of 1857 and Electricity.

[From *L'Electricité*.]

It is a fact now very generally accepted, that the true theory respecting comets was well known to the ancients, and was only lost or abandoned on account of that lack of philosophical spirit on the part of the astronomers, which, especially since the spreading of Laplace's materialistic ideas, has distinguished the adepts of official astronomy. Many different theories have from time to time been advanced to replace those of Seneca and Cordou, but in our opinion the most fallacious is that respecting electricity; and perhaps we may be rendering some service to science and even to common sense to suppose an electric current between the sun and a comet; but to imagine electrical discharges taking place on the opposite, that is to say in the direction of the tail, is a supposition of no value whatever, as a discharge can only occur between two poles of contrary names, or two bodies of different tension.

It could perhaps be understood to take place between the sun and the earth, and thus explain very simply the diurnal illumination, but nothing authorizes the assumption that there is the least discharge in the opposite direction.

Here we beg to remark that the belief in the real existence of the tails of comets in the heavens, although very general, has been very much shaken by the recent developments in the astronomical science.

One writer in the public journals even confessed himself of the opinion that these appendages are occasioned by the illumination of the solid matter which encounters the body of light concentrated in the comet. The prolific imagination of this writer leads him to imagine the electric excitation of ether to replace the luminary of Grégoire, of Cordou, of Keppler, of Seneca, of Hippocrates, of Chion, and of Euclid the mathematician!

of December produced ripe grapes of stronger flavor than usual on the 10th of March. Wheat, barley, and oats shot up with extraordinary rapidity under the influence of continuous light, but did not arrive at maturity; their growth having been too rapid for their strength caused them to fall to the ground after having attained the height of about 12 inches. Seeds of wheat, barley, and oats planted in the open air and grown under the influence of the external electric light produced, however, more satisfactory results; having been sown in rows on the 6th of January, they germinated with difficulty on account of frost and snow on the ground, but developed rapidly when milder weather set in, and showed ripe grain by the end of June, having been aided in their growth by the electric light until the beginning of May. Doubts have been expressed by some botanists whether plants grown and brought to maturity under the influence of continuous light would produce fruit capable of reproduction; and in order to test this question, the peas gathered on the 16th of February from the plants which had been grown under almost continuous light action were replanted on the 18th of February. They vegetated in a few days, showing every appearance of healthy growth. Further evidence on the same question will be obtained by Dr. Gilbert, F.R.S., who has undertaken to experiment upon the wheat, barley, and oats grown as above stated, but still more evidence will probably be required before all doubt on the subject can be allayed.

I am aware that the great weight of the opinion of Mr. Darwin goes in favor of the view that many plants, if not all of them, require diurnal rest for their normal development, and it is with great diffidence, and without wishing to generalize, that I feel bound to state as the result of all my experiments, extending now over two winters, that although periodic darkness evidently favors growth in the sense of elongating the stalks of plants, the continuous stimulus of light appears favorable for healthy development at a greatly accelerated pace through all the stages of the annual life of the plant, from the early leaf to the ripened fruit. The latter is superior in size, aroma, and in color to that produced by alternating light, and the resulting seeds are not, at any rate, devoid of regenerating power. Further experiments are necessary, I am aware, before it would be safe to generalize, nor does this question of diurnal rest in any way bear upon that of annual or winter rest, which probably most plants, that are not so-called annuals, do require. The beneficial influence of the electric light has been very manifest upon a banana palm, which at two periods of its existence—viz., during its early growth and at the time of the fruit development, was placed (in February and March of 1880 and 1881) under the night action of one of the electric lights, set behind glass at a distance not exceeding two yards from the plant. The result was a bunch of fruit weighing 75 lbs., each banana being of unusual size, and pronounced by competent judges to be unsurpassed in flavor. Melons also remarkable for size and aromatic flavor have been produced under the influence of continuous light in the early spring of 1880 and 1881, and I am confident that still better results may be realized when the best conditions of temperature and of proximity to the electric light have been thoroughly investigated. My object hitherto has rather been to ascertain the general conditions necessary to promote growth by the aid of electric light than the production of quantitative results; but I am disposed to think that the time is not far distant when the electric light will be found a valuable adjunct to means at the disposal of the horticulturist in making him really independent of climate and season, and furn-

ishing him with a power of producing new varieties. Before electro horticulture can be entertained as a practical process it would be necessary, however, to prove its cost, and my experiments of last winter have been in part directed towards that object. Where water-power is available the electric light can be produced at an extremely moderate cost, comprising carbon electrodes, and wear and tear of and interest upon apparatus and machinery employed, which experience elsewhere has already shown to amount to 6d. per hour for a light of 5,000 candles. The personal current attention requisite in that case consists simply in replacing the carbon electrodes every six or eight hours, which can be done without appreciable expense by the under gardener in charge of the fires of the green-houses. In my case no natural source of power was available, and a steam-engine had to be resorted to. The engine, of six nominal horse-power which I employ to work the two electric lights of 5,000 candle-power each consumes 56 lbs. of coal per hour (the engine being of the ordinary high-pressure type), which taken at 20s. a ton, would amount to 6d. or to 3d. per light of 5,000 candles.

(To be continued.)

The New Atlantic Cable.

THE *New York World* recently published a special cable despatch from London which gives so interesting an account of the laying of the new cable that we re-publish it for the benefit of the readers of the JOURNAL OF THE TELEGRAPH.

A CABLE FROM MID OCEAN.

"I have received to-day from the Messrs. Siemens Brothers, the constructors of the new American Atlantic cables, the following interesting despatch received by them yesterday at my request from their cable steamship, the *Faraday* in mid-ocean, and announcing the successful laying of the deep-sea portion of the second cable of the new company.

"STEAMSHIP *FARADAY*, latitude 47 north, longitude 43 30 west, September 14, 9 o'clock P. M., Greenwich time.—The *Faraday* has just accomplished her present task, namely, the laying of the deep sea portion of the second of the new American Atlantic cables. Over 1,600 knots of this cable have now been submerged, stretching from the cable landing-place, Whitesand Bay, Cornwall, to a point in the North Atlantic Ocean called the Flemish Cap. This is a bad spot for gales and rough seas, and the ship has been fortunate this time in finding good weather and a calm sea for her difficult operations.

THE STORY OF THE VOYAGE.

"The *Faraday* left her mooring in the Thames opposite Messrs. Siemens Brothers' wharf at Woolwich on the 19th of August at 8-30 in the morning. The shore end of this second Atlantic cable had already been laid in a previous expedition, and on the 22d of August the buoyed end had been picked up. A splice was made and the ship at once began paying out the intermediate portion of the cable. A very rough sea was running at the time of making the splice and as one of the boats which had been lowered and employed in the ticklish operation of taking up the buoy was lying alongside the *Faraday* and was just on the point of being hoisted on board, a heavy sea struck the boat, which washed some of the casks and some other appliances of the boat away. As these casks were marked with the words "*Steamship Faraday, London*," their floating off at once suggested to Mr. Loeffler (the chief engineer in charge, L. J. J.) a possible revival of the mischievous rumors which had on previous occasions been circulated about accidents to vessels at sea on the strength of some waifs floating ashore. In this em-

ergency the convenience of having a telegraph line running from the ship to the shore became very apparent. A message was forthwith despatched by Mr. Loeffler to the shore stating that some casks had floated away, but that no apprehensions as to the vessel's safety need be entertained should these casks be picked up. During the *Faraday's* subsequent return journey another use of our link between the ship and the shore has been developed in the daily sending of correct Greenwich time through the cable. This is a most important matter where such constant and correct observations are required as during a cable laying expedition, when every mile of cable should be laid over well-observed ground. On the 23d of August the ship experienced light easterly winds with a calm sea, and paying out proceeded rapidly and regularly. At 6 P. M. of the same day the sea began to rise. At 1 A. M. of the 24th the ship slowed down and the cable was shifted from the fore to the aft tank. One moment followed of keen observation, and then the word was again given to go ahead at full cable speed, and the paying out continued. When all the intermediate cable had been paid out and when the ship arrived at the edge of the deep water, the end of the cable was sealed and buoyed and the ship returned to Plymouth to take in as large a supply of coal as was possible to be stored in the space vacated by the cable already paid out.

MAKING ASSURANCE DOUBLY SURE.

"This precautionary measure was adopted in order that the ship might be prepared to face the uncertainties of the weather at this season of the year as well as might be. After some delay in Plymouth the ship once more steamed out to sea. In due time the ship arrived again at the buoyed and sealed end of the intermediate cable, which was raised and tested. All being well and the insulation being perfect and everything being ready on board and on shore, the deep sea portion was at once joined on, and the real Atlantic work began in dead earnest. Rapidly we reached deeper and deeper water.

THE ATLANTIC MAPPED OUT.

"On the next morning at 7 o'clock the *Faraday* was in 1,400 fathoms of water, and by noon of the same day we were already in 2,000 fathoms, or about two miles and a half in depth. In the course of this expedition depths up to 3,000 fathoms were subsequently encountered and successfully bridged by our cable. It is astonishing how the different localities of the Atlantic Ocean—which to an ordinary Atlantic passenger appears to be all one vast water waste—are instantly differentiated and distinguished by those in charge of cable laying expeditions. The Admiralty charts have been complemented by the many soundings taken specially by the *Faraday* during this and her former expeditions and on her return journeys, and these are the means of bringing the topography of the bed of the ocean almost as clearly before those who guide these expeditions as if they surveyed a landscape from a balloon.

THE DEEP-SEA WORK.

"Day after day the cable rolled out over the stern-sheets into the deep ocean. On the structure which carries the sheaves overhanging the stern of the ship and which a landsman would call a balcony, two cablemen are constantly watching the cable passing into the ocean. At another place a registering apparatus is watched night and day and every knot of cable is counted as it goes out. This is to control the length of cable paid out and the amount of slack given. In another spot an engineer regulates the strain on the cable by means of the brake applied to the paying-out gear, and watching closely all the time he loosens or tightens his grip on the revol-

ing wheel. Now in one and now in another part of the deck the engineer in charge of the expedition may be seen at any moment, superintending all the operations and guiding the course of that thin thread which will soon connect two continents. Below decks the testing-rooms serve to carry on constant tests of the cable's electrical condition and to exchange messages with the shore. The cable is stowed on board in enormous tanks which look large enough to almost accommodate a circus. Around a central cone of these tanks the cable is constantly unrolling itself, and thence passes over the paying-out gear into the sea. In leaving the tank the cable is kept in position by a set of concentric rings one above the other, each higher one being smaller than the ones below. Cablemen seem to have caught the mariner's fondness for likening his ship to a female being and talking of her stays and waist, for these rings are called the crinoline. At night the whole ship, its huge tank and the path over which the vessel sails are illuminated by powerful electric lamps, which receive their currents from special machines fitted on the vessel. The deep sea work of this second cable is now done.

TWO CABLES LAID WITHIN A YEAR.

"The cable will soon be sealed and buoyed in about 700 fathoms. This is called shallow water for Atlantic cables, and the Faraday will return to take on board the last link, which will complete the new double cable which American enterprise, wielding American capital, projected in December, 1880, and which faithful and hard work will have completed before the same month has come round in 1881."

Remarking upon the subject of the foregoing, the Editor of *The World* says:

The World this morning puts its readers in New York into direct communication with the alert and busy crew of the largest ocean steamship but one in existence, while still actually tossing on the ocean waves a thousand miles and more from either coast of the uneasy North Atlantic. Words dropped, as it were, into the deep mid-sea three days ago half-way between the Old World and the New stand printed this morning in our pages, and these words retransmitted under the Atlantic, may be read again in England days before the skillful and watchful workers whose achievement they record can reach the English shores.

Never before have the actual processes of laying a great deep sea cable been thus chronicled from the very deck on which they were conducted, and this striking despatch will have a permanent interest in the history of one of the most marvellous of the many marvellous achievements of modern practical science. Americans may be justly proud of the energy and skill with which the organization of this first great American ocean cable enterprise has been conducted to its successful issue. Considerably less than a year ago the project was conceived which takes shape to-day in the opening for business of the finest Atlantic cable yet constructed, and in the confident assurance transmitted to us through our London correspondent from the deck of the Faraday that before the twelvemonth is fully rounded to its close a second cable equal in all respects to its companion will be at the service of the public of both hemispheres. Nothing approaching this has been heretofore accomplished, and the confidence of the new American Company in the superiority of its organization and its equipment is attested by the judicious determination of the managers to enter the field of cable competition fairly and honestly by offering the public a better cable service than any of the previously existing companies now are or ever have been able to provide at rates lower than those

which the previously existing companies exacted for an inferior service so long as they imagined themselves to control the cable service of the world. The elements of celerity and of the certainty of delivery within a specified time are of vital value not only in a cable service, but in all services of transportation and transmission. Higher rates of passage are commanded on the ocean by swift and commodious than by slow and uncomfortable steamers, and the growing success of the Pullman palace car system and of swift express lines on our railways indicates the growing demand of an increasing public for the promptest and most efficient service attainable. The quality of the cable service rendered by the European cable companies has steadily deteriorated for a long time past, and as the comparatively low rates now levied by these companies were adopted not at all out of consideration for the public, but avowedly in the hope of preventing the consummation of the American cable enterprise now triumphantly carried out, there is no reason to expect any improvement in the quality of the service rendered by them. Before the second cable of the American Company comes into use with the closing weeks of the current year it will probably have become clear to British as well as to American employers of the cable that the American cable policy of giving the public the best attainable cable service at a fair remunerative price is not only wiser for the company itself, but more just and more satisfactory also to the public, than the system of cutting rates recklessly to-day against a rival organization with an eye to recouping to-morrow mercilessly at the expense of the public.

Faure's Secondary Battery.

The Zeitschr. d. Ver. deutsch. Ing. says: We have already in our columns alluded to the secondary battery of Faure, recently introduced. The probability of its general adoption is doubtful, for it has certain manifest disadvantages, notwithstanding the enthusiasm of its friends. A battery of this description of sufficient size to develop one horse power per hour will weigh 165 lbs., therefore the weight for that power for a day of ten hours is 1,650 lbs., upon the assumption that the battery would yield the same amount of energy during the last hour as the first. This weight has to be handled once a day for charging, and the cost of the charge and the wear and tear of apparatus must be considered. Then for the conversion of the stored energy into motion a suitable machine must be provided, the expenses of which also must be borne in mind. These items, even if they were reduced to the lowest possible amount, would be so considerable that competition with existing small motors would be almost out of the question, and the invention would be used under exceptional circumstances only, where its peculiar advantages could be fully utilized. But, unfortunately, it has fallen into the hands of the financiers, and under their control such advantages as it had are made so costly as to render the discovery valueless. It is proposed to charge one franc per hour per horse-power for ten hours per day for "charge" and use of apparatus, with a guarantee of two years' subscription. This is preposterous when compared with the fact that a gas engine of the same power can be run for about four cents per hour, including rent of engine, without the inconvenience of removing the apparatus daily.

CHINA, spurred to activity by the late threatened invasion of her dominions by Russia, has begun the construction of an extensive railroad and telegraph system.

The Siemens Armature.

THIS ingenious device was originally invented by Messrs. Siemens and Halske, of Berlin, to replace the more defective forms of armature in magneto-electric apparatus. As it has proved to yield more favorable results in generating electricity than most other forms of armature, it may be assumed that it also acts admirably as an electro-dynamic armature. Models of electro-motors made with this armature have returned perhaps the largest proportion yet obtained of the current energy as work.

This armature is about 12 inches in length, with a total exterior diameter of two inches. Its end section somewhat resembles a girder of this shape. This portion is of cast or soft wrought iron. The faces of the armature are turned to the circular form. The wire, three layers of No. 16 silk-covered, is wound upon it longitudinally in the grooved sides and over the ends of the armature. The space left after enveloping with wire is fitted up to the circular form by packing pieces of wood, held in position by a pair of brass rings, sunk in depressions at either end.

The axis of rotation is in a line passing centrally of the armature's length. Brass end plates, carrying the journals and connecting pinion, with the commutator, are screwed to its ends, forming a compact armature, ready for mounting between the poles of a permanent or electro-magnet.

The main object to secure the maximum effect is to set the armature in an intense magnetic field, which will influence it from end to end. This is usually accomplished by forming a pair of long cast iron poles, pieces, or "checks," to which the permanent or electro-magnet or magnets can be attached.

These "checks" are set up in a boring machine (lathe) together, with separating pieces of wood, and the recess or armature chamber, 12 in. in length, is bored out true, not more than $\frac{1}{16}$ in. larger than the exterior diameter of the armature. In this chamber the armature can rotate in close proximity to the polar faces, which may be arranged to envelope each about one third of the armature.

The magnetic battery, formed of steel or hard cast iron U-shaped bars, should be as powerful as possible, according to the number of magnets which may be attached to the polar faces. About 16 of these are bolted together to the lugs on a small magnetizing machine devised by Mr. Wilde. Three, one at either extremity and one at the center, will be found sufficient to magnetize the "checks" to the required strength of a small motor.

THE NATURE reports that a telegraphic experiment of a singular description was tried about the middle of August at the Trocadéro. It consists merely in the reading of large silvered zinc letters, a square metre in size, fixed on a blackened board, by refracting telescopes. This method has succeeded very well from the Trocadéro to the Panthéon—a distance of three miles. The inventor, an officer in the French service, thinks he will succeed in reading messages at a distance of 60 miles under favorable circumstances.

AN ELECTRICIAN at the Palais de l'Industrie, Paris, thus explains the friendly relations that often exist between cats and dogs. Generally, the dog who makes friends with a cat is an old dog, who has lived a good deal and who suffers more or less from rheumatism. Well every time he licks the cat, or passes his paw affectionately along her back, he is simply doctoring his rheumatism by the aid of the electricity in the cat's skin and hair. The dog does not regard the cat so much as a friend as a magneto-electrical machine.

Journal of the Telegraph.

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NEW YORK, OCTOBER 1, 1881.

JAMES A. GARFIELD.

TWENTIETH PRESIDENT OF THE UNITED STATES.

FROM the second of July last until the present, the newspapers, magazines, and other publications, not only of this country but of the civilized world, have been largely occupied in supplying information to eagerly anxious millions of people concerning this great and good man—more especially as to the unspeakably cruel and causeless attack upon him, his condition during eighty days of terrible suffering, and his death, funeral obsequies and burial.

It is not probable that any other man ever lived for whom the keen sympathy of so vast a number of persons was felt, for whose recovery so many fervent prayers were offered, nor whose memory is affectionately cherished so universally.

It is not the province of such a publication as the JOURNAL OF THE TELEGRAPH to make extended reference to this subject, now held sacred throughout the length and breadth of our great land, but it may properly allude to the remarkable career of a poor country boy, whose advantages were so meagre that he had not even learned to read until about fifteen years of age, and had made almost no progress toward education until his eighteenth year, but who, from that time forward, by his own untiring effort and persevering study, so developed his naturally strong, clear and well balanced mind, as to not only secure him, by reason of his own merit, the very highest rank and station, but proved him one of the greatest as well as one of the best among the great men whose lives and conduct have shaped the history of nations and led the thought of the world.

The wonderful development of the telegraph has

hardly been more signally exemplified in any other way than in the almost instantaneous transmission of news of the President's condition and of his death. The people of every little town the country over, as well as in the great cities, the larger towns and in foreign countries, sought this news with the deepest solicitude, and the telegraph companies gladly transmitted it to an extent which the great public will probably never appreciate. The failure to consider this, however, may well be excused in view of the overwhelming sorrow which has come.

At a meeting of the Executive Committee of the Western Union Telegraph Company, September 21, 1881, the following were unanimously adopted:

In the providence of Almighty God, the people of this great country have been called to mourn with heart-stricken grief the death of the Chief Magistrate of the nation.

Resolved, That in the death of James A. Garfield, late President of the United States, the Executive Committee of the Western Union Telegraph Company, in common with the representatives of all the commercial and industrial interests of the country, mourn the loss of a great and good Executive, of a just and able protector and defender of the right, and of an earnest and able promoter of the public welfare.

Resolved, That we extend our profound sympathy and condolence to his grief-stricken widow and bereaved family.

Resolved, That the President be authorized and directed to have the principal offices of the Company draped in mourning.

Ballooning.

THE inglorious fate of Prof. King's recently attempted balloon expedition from St. Paul, Minn., to the Atlantic coast, adds new evidence to the previously well established belief in the minds of most sensible people that the successful navigation of the air by means of a gas bag, which has simply the quality of being lighter than the air, but which has not the slightest power of propulsion nor guidance, and is therefore utterly at the mercy of the elements, is an impossibility, and that any further attempt in that direction, under any conditions yet known, are simply foolhardy exposures of life and limb, which can only be countenanced as bull-fights, tight-rope, and other extremely perilous acrobatic performances are countenanced, to satisfy a morbid curiosity and desire for the exciting and the terrible. If the sad fate of poor Donaldson and his companions, added to the long list of other disasters which have come upon aeronauts of great experience, and all without a single substantial benefit, will not deter men from recklessly exposing their lives in similar "attempts," it is not to be expected that the ludicrous spectacle afforded by the great "King balloon," stranded in a cow pasture, after such brilliant promises of benefits to science, and establishing theories of the upper air currents, will prevent other rash fools from risking their lives in the same way.

If anybody will invent an air ship having a propelling power, and a means of steering which will enable air navigators to at least in some small measure govern the course of their craft, it may be worth while to incur risks in bringing it to perfection, or to a condition of practical utility; until this is the purpose aimed at we would be glad to have the balloon business go out of fashion.

QUARTERLY REPORT OF THE WESTERN UNION TELEGRAPH COMPANY, FOR THE QUARTER ENDING SEPTEMBER 30, 1881.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, September 14, 1881.

In the Report presented by the Executive Committee at the last quarterly meeting of the Board, held June 8th, 1881, the net revenues for the quarter ending June 30th (May being partially and June wholly estimated) were stated at \$1,836,391.00.

The official returns for the quarter (ended June 30) showed the net revenues to be \$1,842,844.22, or \$6,453.22 more than the estimate.

The following revised statement, based upon complete returns, will show the condition of the Company at the close of the quarter ended June 30, 1881:

Surplus April 1, 1881, as per last quarterly report \$1,281,998 58
Net revenues, quarter ended June 30, 1881..... 1,842,844 22

\$3,074,842 80

From which deducting appropriations for—

To Dividends of 1½ per cent. each on Capital Stock.....	\$2,400,000 00
Interest on Bonded Debt.....	106,788 06
Sinking Funds.....	30,000 00
Construction.....	204,782 62
Telegraph Stocks, etc.....	216,063 36
	\$2,947,584 04

Leaves a surplus, July 1, 1881, of..... \$127,258 76

This surplus does not include the cash turned over by the American Union Telegraph Company, amounting to \$238,000; nor does it include the new material turned over by that Company, and which cost about \$235,000, which are held for payment of liabilities of that Company until the final balance shall be ascertained.

The net revenues for the quarter ending September 30, instant, based upon official returns for July, nearly complete returns for August, and estimating the business for September, will be about.... \$1,949,894 61
Add surplus, July 1, as above..... 127,258 76

\$2,077,153 37

From which appropriating for—

Interest on Bonded Debt.....	\$107,000 00
Construction and purchase of Telegraph Stocks and Properties.....	300,000 00
Sinking Funds.....	20,000 00
	\$427,000 00

Leaves a balance of \$1,650,153 37
It requires for the payment of a dividend of 1½ per cent. on the Capital Stock..... \$1,200,000 00

Deducting which, leaves a surplus, after paying dividend, of..... \$450,153 37

In view of the preceding statements, the Committee recommend to the Board of Directors for adoption, the following:

Resolved, That a dividend of one and one-half per cent. on the capital stock of this Company be and is hereby declared out of the net revenues of the quarter, payable on and after the fifteenth of October next to stockholders of record, at the close of the stock books on the 20th of September, instant.

Resolved, That for the purpose of such dividend, the books for the transfer of capital stock in this Company be closed at three o'clock P. M., on Tuesday, the 20th of September, instant, and be reopened on the morning of the 17th of October following.

Respectfully submitted,
NORVIN GREEN,
President.

INQUIRIES having been made on the subject, we note for the information of all concerned, that a new tariff book of the Western Union Telegraph Company is substantially completed as to its preparation, and is to be issued as soon as it can be printed.

At the annual meeting of the stock holders of the Gold and Stock Telegraph Company, held in New York, September 27, 1881, the following named persons were elected as Directors for the ensuing year :

Norvin Green.	Aug. Schell.
J. O. Green.	Thos. T. Eckert.
Jno. Van Horne.	Jay Gould.
T. B. Edson.	Wm. M. Bliss.
Jas. H. Banker.	E. D. Morgan.

At the meeting of the Board of Directors of the Gold and Stock Telegraph Company, held in New York September 28, 1881, the following officers were elected :

President, Norvin Green.
 Vice Presidents, { T. O. Green.
 Jno. Van Horne.
 Treasurer, R. H. Rochester.
 Secretary, L. E. Lefferts.

The Electro-Dynamic Scale of Helmholtz.

[From *La Lumière Electrique*.]

THE scale of E. Becquerel, by which the intensity of the current can be measured by weights, is well known. M. Helmholtz has recently constructed an apparatus similar in its results, but working as an electro-dynamometer, in which the magnets being replaced by solenoides, so that they, as well as the stationary rollers, are traversed by the current.

The following account will give some idea of the construction of this instrument, and the accuracy with which its measurements are made.

To the columns of an ordinary precision scale are attached two galvanized wires, each supporting a flat annular plate or roller, which is inclosed by an isolated metallic wire. Two similar rollers, but small enough to pass through the first one, are suspended to the extremity of the balance, instead of the plates, and when not in motion the stationary rollers are somewhat higher than the movable ones. When a current is made to go through these four rollers, and arrives in the movable rollers by supple plates of foil, one of these last rollers is elevated while the other is depressed ; and in re-establishing the equilibrium by weights, a precise measure of the current can be obtained. By a certain position of the movable rollers under those stationary, the scale preserves all its stability and sensitiveness. The weighing can be made as accurate as to the one-thousandth part of a gramme.

As the action exercised by the current is proportionate to the square of intensity, because this action will be balanced to one gramme, the intensity can be determined by a fraction of 1.2000th.

Some years ago a Mr. Lallemand constructed also an electro-dynamic scale, in which two flat spirals were repulsed more or less, according to the intensity of the currents, by two stationary rollers. The spirals were attached to the extremities of a horizontal lever, moving around a vertical axle.

The action in this apparatus was measured by the twisting of a wire, as in the Coulomb scale ; but the electricity of the twisted wire, which in this case is employed to effect the equilibrium of the electro-dynamic force, can easily vary for the same wire, and the employment of a weight to equilibrate this force shows certainly a marked advantage in regard to the identity of measures.

The Telegraph Service.

IN view of the unprecedented increase of business, and the various other extraordinary circumstances which have occurred, and which could not have been foreseen, it is not surprising that there should have been some complaint on the part of the public of a less prompt and satisfactory telegraph service, for a short time past, than that to which they have become accustomed during the past few years, as a result of the efforts of the telegraph managers to secure and maintain, as nearly as possible, the perfection of service.

The following sufficiently explain themselves :

NEW YORK PRODUCE EXCHANGE,
 NEW YORK, Sept. 16, 1881.

General THOMAS T. ECKERT, General Superintendent Western Union Telegraph Company :

DEAR SIR—Very serious complaints are being made to me that the facilities for transmitting telegraph despatches between this Exchange and the West are entirely inadequate for the volume of business now being transacted.

I desire to call your immediate attention to this matter and to respectfully request that such additional wires and other facilities may be provided as shall promptly meet the requirement of the members of this Exchange. Respectfully yours,
 F. H. PARKER, President.

WESTERN UNION TELEGRAPH COMPANY,
 NEW YORK Sept. 17, 1881.

F. H. PARKER, Esq., President Produce Exchange, New York City :—

DEAR SIR :—I am this morning in receipt of your letter of yesterday, which, however, first came to my notice in the newspapers before I reached my office. Permit me to say that I can hardly consider your course in publishing such a document before it was possible for you to receive a reply to it consistent with commercial courtesy. I shall, therefore, endeavor to give similar publicity to this letter, that the company may be saved from the reflections the unqualified terms of your complaint are calculated to throw upon it. The facilities of this company for the transmission of dispatches to and from the West are more than adequate to the demand of ordinary business. But the delays which have occurred during the last few weeks have been due to three causes, which were entirely unforeseen, and against which it was impossible for us to make immediate provision, viz. :

First—The attempted assassination of the President created a demand upon us throughout the country which it became our duty to give the first attention. So great has this demand been that the company has transmitted about 2,000,000 bulletins (equivalent to 4,000,000 messages of average length) since the 2d of July last. And I presume the most captious will hardly complain because we have made so great an effort to assuage the anxiety of the people at large during a most terrible national calamity.

Second.—The forest fires in the Middle and Western States have caused continual interruptions to our wires, in some instances prostrating all our trunk lines and cutting us off from any communication with Chicago and other Western produce markets. The authentic reports of the devastation those fires have made in the localities through which our lines pass give sufficient evidence of the difficulty we have had in coping with troubles entirely beyond human control.

Third.—The increase in the number of commercial messages has been far beyond the natural growth of business expected, being more than 50 per cent. above that of the same season of any year in the company's history, and far beyond any reasonable

anticipations. This enormous increase is pressed or immediate transmission during about five hours of the business day, and the very prompt service the company has been rendering has so increased the exactions of that class of customers that nothing short of immediate transmission will avoid complaint.

The first two of these causes are entirely temporary, but, combined with the third, have made a demand upon us of such magnitude that no provision the Western Union Telegraph Company could have made would have been sufficient to insure the same precision in its business as under other circumstances. We are, however, making every effort to transmit our messages with the utmost dispatch, our employees are rendering faithful and efficient service, and our facilities are being so increased as to make ample provision for any requirements of the public; the erection of about 10,000 miles of new wire having been commenced in the early Spring, and as much more has since been undertaken in consequence of the extraordinary demands. We are pushing this work with all the energy possible, and in view of the circumstances above recited, and of the fact that to erect wires for distances so great, for example, as between Chicago and this point, is a work of time, I have no doubt we shall receive from the public at large, and from all business men especially, a reasonable degree of consideration.

Yours respectfully,

THOMAS T. ECKERT,

Vice-President and General Manager.

[Chicago Morning News, September 15.]

The charges recently made against the Western Union Telegraph Company, alleging that the service is inadequate and insufficient, owing to long and vexatious delays in the sending of messages and too frequent errors in their transmission, are met with a general denial at the hands of the officers of that company.

Colonel R. C. Olwry, the General Superintendent of the Western Union, was seen yesterday by a *Morning News* reporter. Colonel Olwry's attention was called to the statement that one cause for this alleged state of affairs was the reduction of the salaries of operators, which, it was said, had caused many of their first-class men to leave the Western Union for other employment.

Colonel Olwry said : "It is not true that operators' salaries have been reduced. On the contrary while reductions of expenses have been made by discontinuing the salaries of some officials under the consolidation, the salaries of a large number of operators have been increased, and the salaries of absolutely none have been cut. The pay of over 100 operators in the Chicago office alone have been raised since the consolidation."

"It is charged that there are a great many delays in the sending of business messages," suggested the reporter.

"Well, there has been an extraordinary speculative boom and our business has increased enormously. Consequently there has been some delay. As an illustration of the boom in speculation, a broker recently said that where formerly he had one speculative customer he now has six, and that remark will prove true of all, or nearly all, the brokers of Chicago. Again, this speculative boom has run so high that brokers and business men require a much prompter service than ever before."

"How about the alleged delay in press despatches and specials?"

"I deny that there has been any serious or unusual delay in press matter, except in a few isolated instances which were governed by exceptional cir-

circumstances. We have had of late a large number of storms, but we are sparing no money or expense in putting up additional wires."

F. H. Tubbs, Superintendent of the Western Union, interposed to say; "In proportion to the amount of business being done, the delays are no greater than they have always been."

Colonel Clowry—"As to the character of our operators, you can say further that we are employing all the men we can get, at liberal salaries."

[N. Y. World, September 18.]

A reporter of *The World* was yesterday sent to see General Eckert in regard to the complaints made by some members of the Produce Exchange of the service of the Western Union. General Eckert was found at the Western Union office preparing to leave for Long Branch. The reporter said to him: "Did you receive a letter, General Eckert, yesterday, from President Parker, of the Produce Exchange?"

"No, sir; I received a letter from him on my arrival at the office this morning, having previously read it in the papers."

"Shall you make any reply to the letter, General Eckert?"

"Yes, I have replied to it already; but I will not trouble you with my reply, as I intend to make it as public as the letter was made, and shall give it to the Associated Press."

"Do you object to saying whether there is any foundation, General Eckert, for these complaints?"

"Certainly the service has not been all that we wish it to be. It would be extraordinary if it had been, when you consider what an enormous amount of business was gratuitously undertaken by us to relieve the intense anxiety excited by the horrible news of the attempted assassination of the President, in every city, town and village throughout the Union in which a telegraph office exists, an anxiety which has been kept alive from day to day ever since, over a period now of more than eleven weeks. Not at the Produce Exchange only, but the press also have complained of the consequences of this state of things."

"May not the complaints of the press in part have originated in the diffusion of news about the President by the telegraph?"

"You can judge of that better than I."

"But have you had any particular complaints of this sort from the press?"

"Yes; but you will excuse me if I prefer not to say from what quarter."

"You say this extensive service about the President, General Eckert, has been gratuitous? Do you mean that you have received no income from it?"

"Not a penny! It was done to relieve the intense anxiety of all classes, rich and poor, all over the country. We were very glad to do it, and I believe we have earned and will receive the thanks of the people for it."

"Was not the cost of such a service very considerable?"

"Yes. If charged at half our commercial rates it would have been worth to us over half a million of dollars."

"Has this been the only extraordinary pressure put upon your wires?"

"No. We have had an increase in our general paying business of over 50 per cent. during the past summer."

"Are there any other causes besides these two to which you can attribute the pressure which has led to these complaints?"

"Well, perhaps; but as you see, I am on my way out of town, and perhaps you will excuse me if I do not go into the subject further at present."

At this moment a messenger came in with a despatch, which he handed to General Eckert, who opened it, read it, and, with a smile, handed it to the reporter, saying:

"Here is a despatch which may throw some light for you on the subject. It is quite at your service if you wish to publish it," and the General excused himself and took his departure. The despatch was from Mr. Gifford, at Syracuse, N. Y., and read as follows: "Every available man now employed fighting fire. We are in bad shape, especially west of Syracuse."

A New Method of Obtaining Absolute Measurements of Electric Force.

A RECENT number of the *Göttinger Nachrichten* contains a description, by M. Edward Riecke, of a series of measurements of electric intensity taken with an apparatus with two disks, revolving inversely.

The inventor puts them into motion with the hand, which is to be regretted, and can only be permitted after the example given by M. Vigouroux in the cabinet of physics of Salpêtrière. M. Riecke, giving in proof a short review of many different experiments upon the same subject, affirms that the electric force is, assuming everything being equal, proportional to the velocity of rotation; that is to say, one wheel revolving five times per second will occasion five times more electric effect than if it revolved only once per second.

This result, confirmed by exact measurements, is not at all surprising, since one can give to the movable plates a sufficient velocity in order that the rapidity with which the molecules exchange places, shall be in conformity with the expansion of the electric fluids.

The practical conclusion which must be drawn from this would seem to be that it is absurd to employ an apparatus with two revolving discs, and that to double the rapidity of rotation of the movable disc, by rendering stationary the one in juxtaposition, would be a great deal simpler.

We see that the motive power consumed in the production of electricity from tension is composed of two kinds: one being necessary to overcome friction and the resistance of the air, and the other to conquer the electro-dynamical reactions.

Different writers, who attribute everything to the mechanical equivalent of heat, speak only of the second and entirely neglect the first consideration, which renders their determinations, in this respect at least, of no practical value.

Admitting the utility of this application of the subject, the next step is to determine the influence of the hygrometric state of the air. But this is arrived at by means of a law far less simple to understand or comprehend. If we represent by h expressed in centesimal parts of the saturation represented by 1.00, the quantity of electricity put in motion is given by the equation $e = \text{constant} - a h^2$.

a is a variable coefficient which increases with the rapidity of rotation. The constant is the quantity of existing electricity for the state of absolute dryness, say, $h = 0$.

The influence of the velocity proves from what the losses are produced by molecular induction, and that the velocity of this induction is comparable to that of the rotation.

If the laws of the variable coefficient were known, and if the influence of the temperature had been fully ascertained, the determination of the explosive distance after a constant number of revolutions of the wheel could be employed in meteorology. A record might easily be kept of the number of revolutions of the wheel necessary in order that the spark

of a machine leaps a gap of a centimeter for instance.

The electric machine, with a glass wheel, can consequently be changed into an apparatus of instantaneous measurements. Want of space does not permit us to give a full description of this interesting piece of workmanship, and which only would suffice for a thorough understanding.

The Planté and Faure Batteries.

SPAKING of the relative merits of the two batteries, M. Faure says in a letter to "*The Electrician*," M. Planté has the merit of being clear in the exposition of his ideas and researches, and in his remarkable work "*Recherches sur l'Electricité*," he tells us exactly how his battery is made, how it is "formed," and what it does when so made. Referring to this last point we read that a battery can furnish a constant current through fifty metres of copper wire one millimetre in diameter, say one ohm during one hour. Now, if we take the electromotive force at 2.20 volts we find for the work so given out

$2.20^2 = .5$ kilogrammetres per second during one

1×9.81 hour, or an absolute total of 1,800 kilogrammetres. And for the sake of comparison we may also say that the above battery would furnish a current of 2.2 webers for an hour. As Planté batteries may not be in the hands of everyone of your readers, and as I was fortunate enough to obtain an assorted supply before the scarcity set in, I will give a few figures which are the results of my experiments, and somewhat corroborate the above statements. The best cell that I could procure, and which had been nearly two years in formation at the makers in Paris, gave me, when properly charged, a current of twenty webers during five minutes. The two lead electrodes are each one millimetre in thickness and 65 millimetres long, by 20 centimetres deep. The amount of suboxide of lead which had been formed upon the positive electrode I found by drying and weighing to be 75 grammes. I will at once here make a comparison. In some of my round cells, having electrodes of the same size as the above, that is 65×20 , I have placed upon the positive electrode 2,000 grammes of red lead (a similar quantity being also placed upon the negative electrode). The current which this arrangement furnished me was about equal to 20 webers during two hours and a half or nearly proportionate to that furnished by the Planté battery, taking into account the relation $\frac{2000}{75}$ of lead

oxide brought into action in both batteries. The least perfect of my Planté cells, which had been "formed" during three months only, gave me only about one-fourth of the above work. I state simply facts, but it is said that the above mentioned perfect Planté battery might have been made in three months instead of two years. Let it be so, and let us suppose that the Faure battery has no greater capacity of storage than three or four times that of some of the old Planté batteries in existence, still I beg to say that it exists, and is perfectly well covered by valid patents, and as such will be of great value to the electric industry. Upwards of twenty-five tons of Faure batteries have been made, and experiments on a commensurate scale carried out during a year of silence, and from trustworthy experimental work I have acquired the certitude that there are great things in it.

An advertising van lighted with electricity is one of the latest curiosities to be seen moving along the Paris boulevards at night.

Tariff Bureau.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, October 1, 1881.

To all offices on Western Union lines:

The following changes and additions have been made since the date of the last circular:

The letter "S," placed after an item under "General Information," indicates that the name of the office to which the item refers will be found only in the Supplement.

The letter "a" is given after changes which should be made only in the Tariff Book.

All changes made in the Tariff Book should be made in pencil.

Unless otherwise stated, all changes given below will take effect October 1, 1881.

GENERAL INFORMATION.

All the *Other Line* offices in New York, Maine, New Hampshire, Vermont, Ontario, Quebec, New Brunswick and Nova Scotia which, by the order in the JOURNAL of September 16, are to be checked direct on and after October 1, are half-rate offices, to which night messages may be sent at one-half of the day rates. No message to be accepted for less than 25 cents.

ALABAMA.

285 Gadsden, closed.

ARIZONA.

Camp Apache, Camp Bowie, Camp Grant, Camp Thomas and San Carlos now 25 1 Wilcox or El Paso, Texas.

* Globe City now 75 5 Wilcox or El Paso, Texas.

* Camp Lowell now 25 1 Tucson or El Paso, Texas.

Erase the rate and route via Maricopa Wells to the above places.

COLORADO.

623 Arkansas changed to 623 Salida. S.

DAKOTA.

Burbank, closed. S.

DELAWARE.

60 Rehoboth, closed. S.

FLORIDA.

* Micanopy, closed. S.

GEORGIA.

* Sulphur Springs, closed. S.

187 Tebeauville, closed.

ILLINOIS.

300 Allendale, closed.

INDIANA.

281 New Ross, closed. S.

IOWA.

* Beloit, closed. S.

KANSAS.

466 Avondale changed to 466 Lane.

LOUISIANA.

* Locharbor, closed. S.

MAINE.

11 Gardiner is now in Square 14.

* Mill Bridge is now a half-rate office.

MARYLAND.

67 Still Pond, closed. S.

MASSACHUSETTS.

* * Campello now * Campello, 10 cents, by telephone, Brockton.

28 Princeton now * Princeton, 15 1 from Princeton Depot. West Medford, closed.

MICHIGAN.

138 Chippewa, reopened.

250 Palmer's P. O. is Orleans.

* Samaria now Western Union office, square 211. S.

MINNESOTA.

Kennedy, closed. S.

NEW HAMPSHIRE.

* Bedford, closed.

27 Bethlehem, closed.
27 Crawford House, closed.
27 Glen House, closed.
27 Profile House, closed.
27 Mount Washington, closed.

NEW JERSEY.

All messages for Oak Cliff, except those pertaining to Live Stock, will be checked with Guttenberg.

47 Sea Girt, closed. Messages for Sea Girt delivered from Squan. Charges for delivery 25 cents. S.

NEW MEXICO.

Fort Cummings, Fort Bayard, and Silver City now 25 1 from Lordsburg or El Paso, Texas. Erase the rate and route via Maricopa Wells.

NEW YORK.

40 Catskill Mountain House, closed.

* Manneville, closed. S.

87 Missen Top, closed. S.

Monticello, closed.

* Sandy Creek Junction, closed. Messages for Sandy Creek Junction delivered from Lacona. Charges for delivery 25 cents.

38 Shelter Island, reopened.

57 Trenton Falls, closed.

OHIO.

Lakeside, closed. S.

ONTARIO.

* Caledonia Springs, closed.

PENNSYLVANIA.

85 Gettysburg Springs, closed.

111 Kinsua Junction changed to 111 Minard. S.

130 Lakeville, closed. S.

58 Rowland's, closed.

QUEBEC.

* Magdalen River Village, closed. S.

SOUTH CAROLINA.

* Georgetown now 50 3 Kingstree. S.

TENNESSEE.

* Hurricane Springs, closed. S.

TEXAS.

460 Buchanans, closed. S.

VERMONT.

38 East Highgate Springs, closed. S.

39 Sudbury, closed. S.

30 Sheldon, reopened.

VIRGINIA.

133 Blue Ridge Springs, closed.

* Rope Ferry, closed. S.

153 Sweet Chalybeate Springs, closed

WEST VIRGINIA.

153 Sweet Springs, closed.

WISCONSIN.

Chippewa, closed. S.

Devil's Lake, closed.

Lowell, closed.

Worcester, closed.

NEW OFFICES.

"Messages for transmission by telephone" will be accepted only "at sender's risk." See places named below to which messages are forwarded by telephone.

COLORADO.

628 Salida.

DAKOTA.

Ashton.

Harwood.

Lake Preston.

Milletta.

GEORGIA.

246 East Point.

ILLINOIS.

337 Athens.

347 Atterbury.

337 Bates, Sangamon Co.

347 Kilbourne.

347 Topeka.

317 Wing.

IOWA.

Anderson. Check Hastings.

417 Brazil.

435 Breda.

444 Meriden.

KANSAS.

520 Burr Oak.

527 Bull City.
466 Lane.
527 Logan.
520 Mankato.
527 Marvin.
523 Osborne.
520 Republic City.
520 Talmadge.
517 Yuma.

LOUISIANA.

* Almetia (H. E.), 50 4 Tallulah.
* Villivista, 50 4 Tallulah.

MASSACHUSETTS.

28 Princeton Depot.

MICHIGAN.

211 Asalia.

250 Nelson, P. O. care McBrides.

MINNESOTA.

Courland.

Ghent.

MISSOURI.

* Arthur, 25 2 Nevada or Pleasant Hill.

406 Crawfordville.

388 Durham.

406 Green City.

427 Humphreys.

388 Hurdland.

388 La Belle.

* Malta Bend, 15 1, by telephone, Miami Station.

406 Milan.

* Waverly, 20 1, by telephone, Miami Station.

NEW JERSEY.

47 Edgewater.

41 Sterling.

NEW YORK.

40 Brown's Station. Check Shokan.

73 Morristown.

NORTH CAROLINA.

125 Jonesboro.

OHIO.

* Harveysburg, 15 1, by telephone, Corwin.

PENNSYLVANIA.

111 Minard.

QUEBEC.

Hulets Landing.

Beauce Junction.

St. Alphonse de la Grand Boie.

SOUTH CAROLINA.

136 Lanes.

TEXAS.

Tariff to Sq. 972 ten cents more than to Sq. 971.

972 Aroya.

* Banquete, 25 2 Corpus Christi.

971 Midway.

972 Quito.

VIRGINIA.

* Big Island, 40 3 Richmond.

123 Fort Republic.

WISCONSIN.

Antigo.

Edmunds.

ATLANTIC CABLE.

The cable between Rio Grande and Montevideo, South America, has been interrupted.

NORVIN GREEN,
President.

Transfer Service.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Sept. 29, 1881.

To all Transfer Agents and offices.

The transfer service has been discontinued at Cape May and Long Branch, N. J.

NORVIN GREEN,
President.

DIED.

STANTON.—At St. Louis, Mo., September 14, 1881, Clara, beloved wife of W. H. Stanton. At the same time and place, the infant son of W. H. Stanton.

Electric Storms.

It is well known that electric and magnetic storms not unfrequently interfere seriously with the working of telegraph lines. A notable instance of this occurred recently, during which a magnetic storm, unaccompanied by any marked aurora, affected chiefly the lines between New York and Chicago, and simultaneously the cables across the Atlantic, delaying business thereon several hours.

About a year ago a similar storm occurred, appearing first at North Sydney, Cape Breton, and coming west to Bangor, Boston and New York. Its force was only moderate at Albany, but was strong at Buffalo, beyond which the wires of the Western Union Company seemed to be out of its track, as no trouble existed at Cleveland or west of that point. The N. Y. Sun, a few mornings ago, contained the following account of an interview between one of its reporters and a representative of the Western Union Company.

"How does a magnetic storm interfere with you?"

"By interfering with our regular battery currents. There are all sorts of theories about these disturbances, but in my opinion they indicate a marked disparity between the electrical condition of the earth and the atmosphere, and the equilibrium is restored by discharges between the two. Motion follows the line of least resistance, and the electric currents seize upon our wires which have earth connections, and the passage of the battery currents are subjected to fitful interruptions. Sometimes the magnetic storm takes such complete possession of the wires that we can work by its currents, dispensing altogether with our battery power. We have repeatedly worked to Washington by means of such storm supplies. In working by atmospheric electricity the wire is put to earth at each end, clear of the battery. The atmospheric electric current moves over the circuit, and we can send messages by it. I think it was in October, 1872, that we had the last great electric storm. It lasted four days. At that time we worked our New England press circuit, taking in New Haven, Hartford, Springfield, Worcester, Boston and Providence, by means of the atmospheric electricity without using our batteries at all. Such currents are variable in their intensity and fluctuating in their action. I once attached a galvanometer to an affected wire, and noticed that the discharges along the wire corresponded with the flashing of the northern lights."

"Could you work by the atmospheric currents during the storm of Monday night?"

"No. It was not strong enough for that. It was just strong enough to embarrass us. Operators would be able to send a few words, and then the atmospheric currents would get hold of the wires, neutralizing our battery power. In ordinary messages the difficulty of operating wires under such circumstances is not as great as with code messages, for in the former the receiving operator has the context to help him to make out imperfectly transmitted words, while in code messages every letter must be transmitted with exactness."

"How do magnetic storms affect the cables?"

"They seem to impair the electrical equilibrium of the two continents, causing earth currents to flow from one shore to the other through the cable."

"Is there any trouble to-night?"

On enquiring of the operator at the cable end in New Foundland, the reply was received: "We are still feeling the storm."

This was at 6 o'clock. After 10 o'clock New-foundland reported, "Interference almost closed, and cables working duplex." At 12 o'clock the business from Europe for America was clear, but messages for England from this country were two hours behind.

The effects of the storm were felt on the wires to Chicago, though not enough to interrupt business; but for fear the disturbance would increase, sixteen wires were worked up to midnight, in order to get through messages for that point.

Strong Magnets.

For some time past M. Trouvé, the eminent Parisian instrument maker, has been engaged in discovering the best mode of making powerful magnets of identical strength. For this purpose he has investigated the best kinds of steel, the most suitable degree of temper, and the most practical and simple method of magnetization. In testing the different kinds of steel, he cut the pieces of the same dimensions and magnetized them, then measured their portative force. They were afterward tempered and magnetized anew. The portative force after this second magnetization has led M. Trouvé to the conclusion that the best French steel for making bar magnets is that of Alleward, as already known. He also finds that the portative forces, as determined after the two magnetizations, are connected by a simple law, which can be expressed by saying that they are to each other in the ratio of $n:n^2$, that is to say, if the portative force of the first magnetization is represented by 2, 3 and 4, that due to the final or saturated magnetization is represented by 4, 9, 16. As regards the temper of the steel, M. Trouvé finds that a regular temper is necessary, and to insure this condition he employs a muffle furnace heated by gas to a constant temperature. The actual magnetization of the bars is performed by placing them in two solenoids in juxtaposition, and closing the magnetic circuit by means of two plates of soft iron. The solenoids are then electrified by means of the current from six Wollaston elements. By proceeding in this manner M. Trouvé succeeds in preparing bar magnets which will sustain from twelve to fourteen times their own weight, and if they are bent into the horseshoe form the portative force is quadrupled, that is to say, it becomes from forty-eight to fifty-six times the weight of the magnet.

A New battery carbon, which is said to have as much conductivity as retort carbon and to be more electro-negative, has been invented by Signor Mauri. He sets about its construction in this way. Sulphur free from carbonates is well mixed with an equal part by weight of thoroughly pulverized graphite and then heated in an iron vessel until the sulphur is thoroughly melted, care being taken meanwhile that the temperature does not rise above 200°. As soon as the mass appears quite fluid it is poured into a mould of the desired size and shape, and immediately afterward a thick copper wire, bent zig-zag, is inserted into the mixture, a small portion of the wire being kept above it. When the contents of the mould become solid under slow atmospheric cooling, they can easily be withdrawn in a single compact form, which constitutes the "carbon" all ready for use. If greater resistance is required, all that has to be done is to increase the proportion of sulphur. Coke powder, which has too little conductivity, cannot take the place of the graphite.

Personal.

INFORMATION is wanted concerning Charles Hammond, a telegraph operator at Salem, Illinois, so long ago as 1867. Address, W. H. Batterson, Stratford, Fairfield Co., Conn.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

P. O. Box, 3175. New York, September 30th, 1881.
FIFTEENTH ANNUAL MEETING.

THE Fifteenth Annual Meeting of the Telegraphers' Mutual Benefit Association will be held in this city, on Wednesday, November 15th, 1881.

It is hoped that the members will, if unable to attend, be fully represented at this meeting, as important amendments to the Constitution and By-Laws, submitted at last annual meeting, will then be acted upon.

Blank proxies will be duly forwarded.

As our fiscal year ends October 31, it is requested that all assessment dues and fees be remitted, before that date, in order that the Secretary and Treasurer may be enabled to close their accounts for the year, and render a complete report.

The dues for Assessment 144—levied August 1st, 1881, and on which membership, if unpaid, lapses 30th September, inst.,—of members holding certificates of the following numbers, have not yet been received by the Secretary.

ASSESSMENT 144.

67 99 148 169 182 185 186 187 455 483 490 496 503 505 506 507
697 705 729 886 1071 1 04 1234 1412 1553 1556 1557 1570 1613 1670
1712 1729 1810 1946 1947 1973 2048 2056 2095 2115 2151 2192 2236
2241 2278 2279 2281 2282 2283 2297 2442 2455 2499 2538 2542 2552
2649 2653 2714 2734 2755 2884 3067 3133 3177 3203 3204 3206 3274
3279 3331 3371 3442 3475 3478 3479 3548 3621 3641 3647 3652 3653
3694 3709 3710 3713 3748 3827 3842 3870 3872 3929 3939 3947 3949
3963 3968 3969 3970 3981 3988.

WATSON D. SOHRAM,

Secretary.

P. O. Box 3175. New York.

DIVIDEND No. 57.

WESTERN UNION TELEGRAPH COMPANY,
New York, September 14, 1881.

The Board of Directors have declared a quarterly dividend of ONE AND ONE-HALF PER CENT. upon the capital stock of this Company from the net revenues of the three months ending September 30th, instant, payable at the office of the Treasurer on and after the 15th day of October next, to shareholders of record on the 30th day of September, instant.

The transfer books will be closed at three o'clock on the afternoon of the 20th of September, instant, and opened on the morning of the 17th of October next.

R. H. ROCHESTER,

Treasurer.

BALDWIN, HOPKINS & PEYTON,

PATENT ATTORNEYS,

WASHINGTON, D. C.

Established 1859.

Local references furnished.

Patent solicitation and litigation, exclusively, in all its branches. Electricity a specialty.

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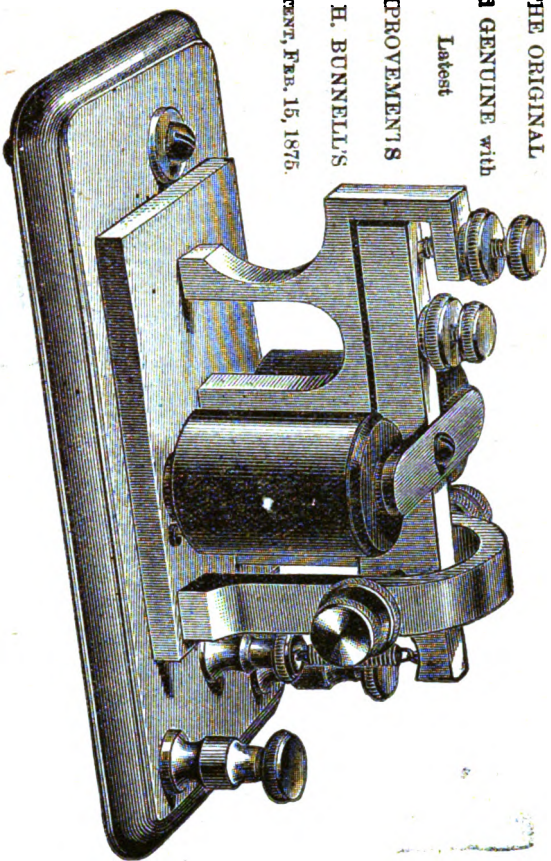
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FRENCH BATTERY
RELIEVES
RHEUMATISM
AND ALL
NERVOUS COMPLAINTS.
Supersedes all others.
Send for circular.

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J. H. BUNNELL & CO.'S FIRST CLASS TELEGRAPH MACHINERY.

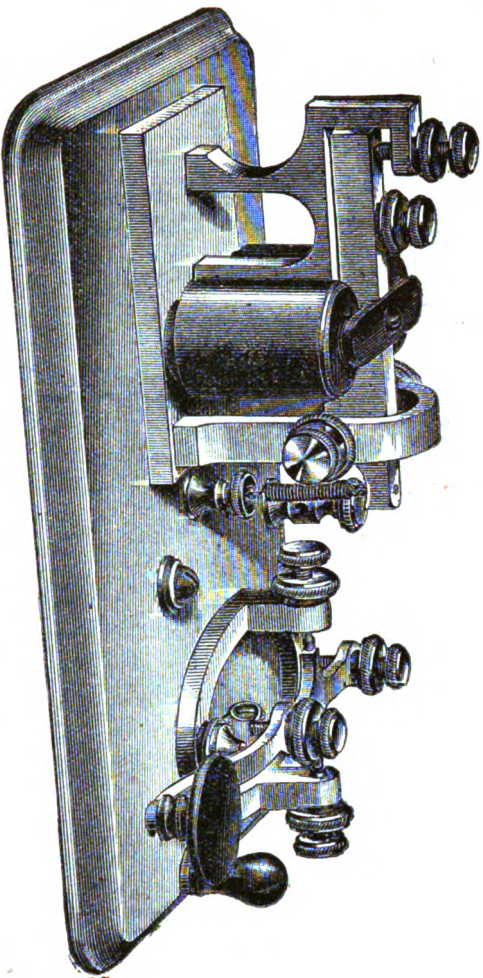
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Latest

IMPROVEMENTS
J. H. BUNNELL'S
PATENT, FEB. 15, 1875.



THE GIANT SOUNDER—UNEQUALLED!

We call attention to the fact that we are making these unrivalled Sounders our own original invention, with our latest improvements added, at a lower price than has ever before been reached. Every Sounder warranted first-class in all respects, and with loud and clear tone. PRICE \$5.00, carefully boxed and sent by mail, prepaid, to any part of the United States.



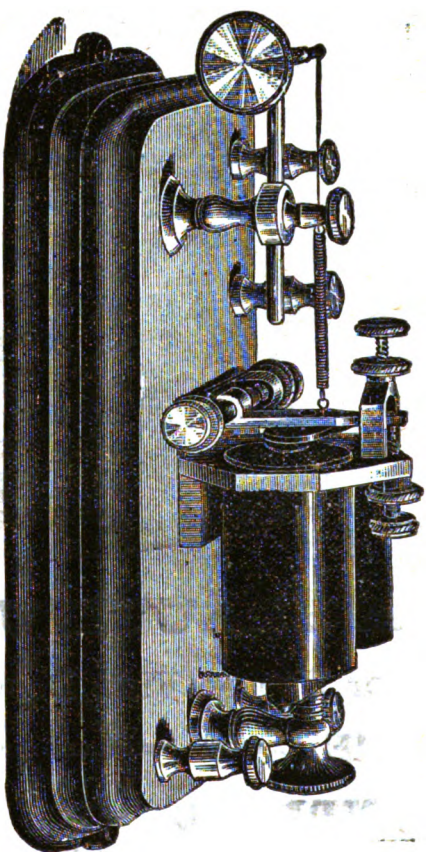
GIANT SOUNDER, (20 OHMS RESISTANCE) AND STEEL LEVER KEY.

COMBINATION SET:

For Private Wires, Main Lines, etc., up to 25 miles in length—Warranted—consists of our standard first-class Giant Sounder, finely finished, with Rubber-Covered Coils, fine Silk-Covered Wire, wound to 20 ohms resistance, mounted on Polished Mahogany Base, with a Steel Lever Key, making the prettiest and most perfect set of short Main Line Instruments ever produced. PRICE \$8.00, carefully boxed and sent by mail, prepaid, to any part of the United States.

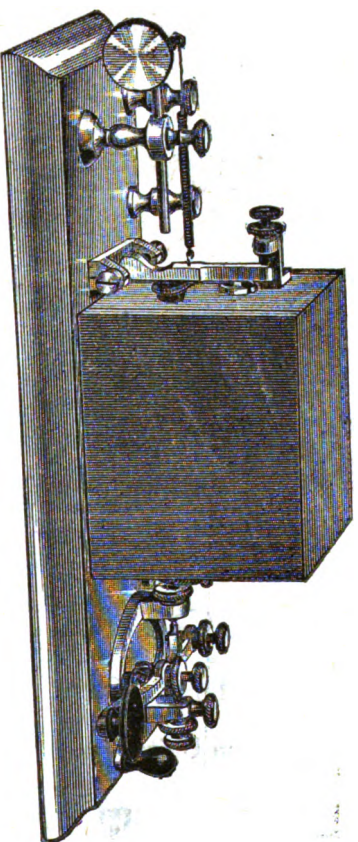
All of these prices subject to liberal discount on orders in quantity.

J. H. BUNNELL & CO., TELEGRAPH AND TELEPHONE SUPPLIES, 112 LIBERTY STREET, N. Y.



FIRST-CLASS MAIN LINE RELAYS. WESTERN UNION STANDARD.

150 ohms resistance, Silk-Covered Wire, Polished Rubber-Covered Coils, Mahogany Base, mounted on Ornamental Surbase, Extension Adjustment. Price, \$8.50.



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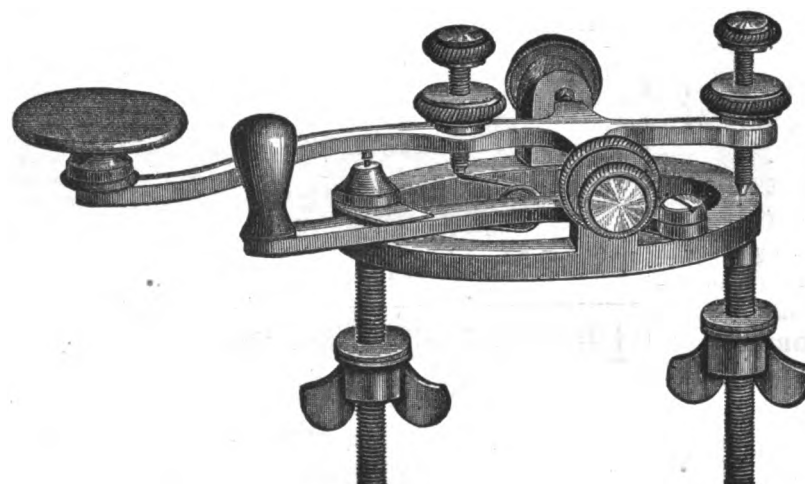
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For Main Lines up to 600 miles in length. Of best construction for loud, clear sound without local sounder. Polished Mahogany Box and Base; 150 ohms Silk Wire. Price, with Steel Lever Key on base, \$12.00; without Key, \$9.00.

Send for estimates if you want low prices and first-class apparatus.

J. H. BUNNELL & CO.'S NEW STEEL LEVER ^{SOLID TRUNNION} KEY.

BEST IN THE
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We have much pleasure in being first to make and bring to the notice of Telegraphers and Managers of Telegraphs this new and important improvement in keys.

We offer it as being *more durable* and in every respect *better* than any other for rapid and perfect sending for the following reasons:

The Lever is *only one-half the weight* of the ordinary brass lever as generally made.

The entire Lever and Trunnions together being made of *but one piece* of fine wrought steel, the common defect of loose trunnions is avoided, the strength of a heavy brass lever is obtained with much less weight of metal, and, by the perfect bearing which the solid trunnion gives, together with the use of *hardened platina points*, *sticking is absolutely prevented*.

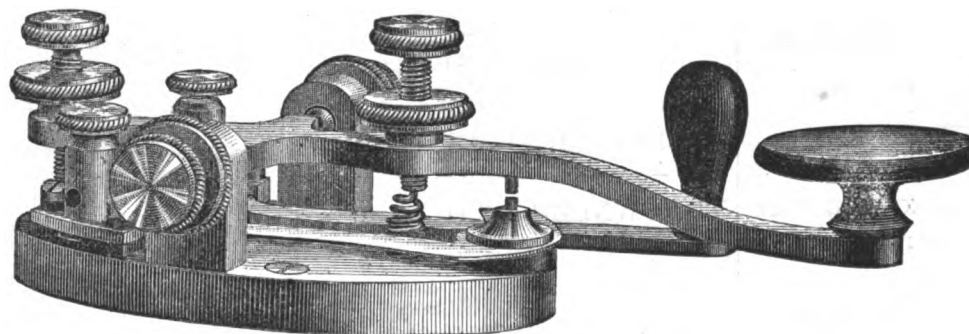
The size and proportions are such as to make it the most perfect operating key possible to obtain, either for the hand of the skilled and rapid expert, or the beginner.

PRICE, \$3.00. Finely Finished, and Lever Nickel-Plated.

Liberal Discount on Orders for Company Supply.

 Steel Lever Key sent by mail, post-paid, to any part of the U. S. or Canada on receipt of the above price, by Registered Letter or Money Order.

Legless Pattern Steel Lever Key.



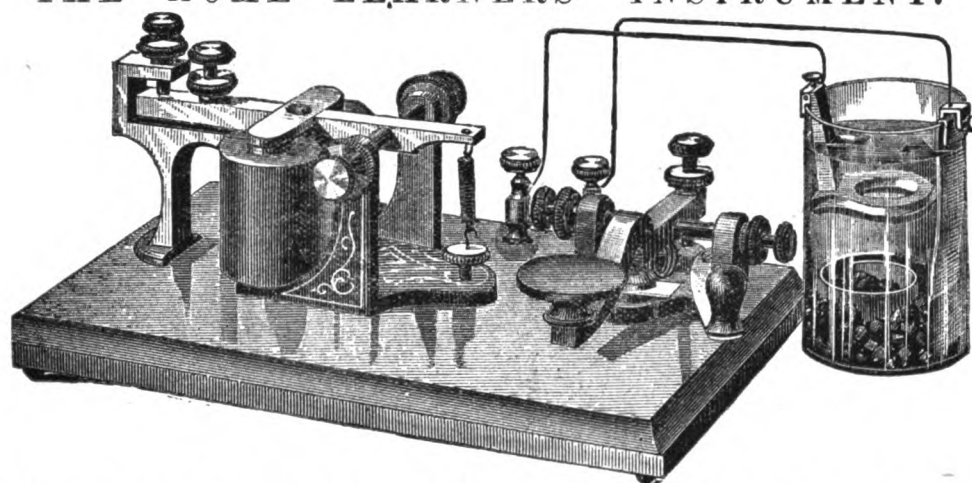
A BEAUTIFUL AND PERFECT KEY,

Suitable for Use on Fine Desks or Wherever a Legless Key is Preferable.

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Price for Complete First-Class Out-Fit, \$4.50
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For the above complete and Perfect Sounder and Key Combined, on mahogany base, including Battery, Chemicals, Wire, Book of Instruction, and everything necessary for a FIRST-CLASS TELEGRAPH OUTFIT for the Student's use, for practice AT HOME, or for operating ALL SHORT LINES OF TELEGRAPH.

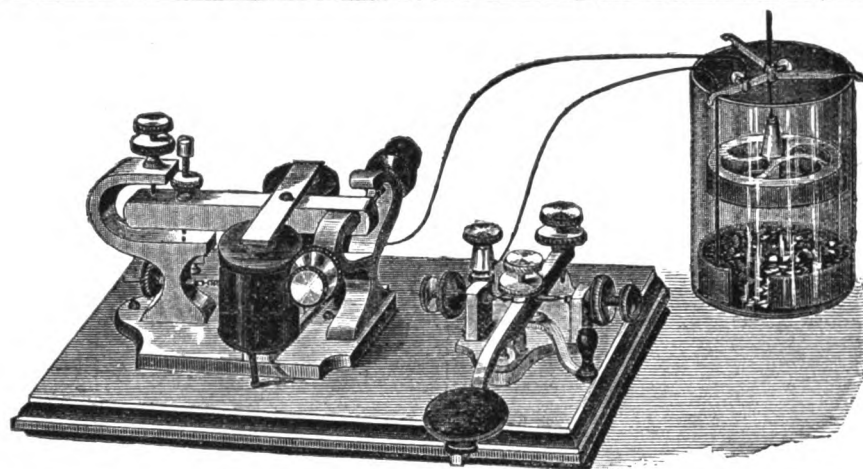
Instruments without Battery, \$3.80: same by mail, post-paid, \$4.30. Instruments without Battery, wound with fine wire for lines 1 to 15 miles, \$4.50; same by mail, \$5. Cell of Battery, 65 cents. Instruction Book, 30 cents. Galvanized Telegraph Wire, per 100 feet, 30 cents. Remit by Postal Money Order, Draft or Registered Letter.

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The O. K. Outfit will be sent to the address of any Express Agent or other responsible party, C. O. D., with privilege to examine before paying charges.

And If not found as Represented, to be Returned at my Expense.

These Instruments are no cheaply made iron things, but are **All Brass**, and nicely finished; are full size, and beautiful in design. The Key Knobs are rubber, and the Contact Points are pure platinum. The outfit consists of—

1 Key, 1 Sounder, 1 Full-Sized Cell Callaud Battery,
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1 Pound Vitriol, 15 ft. Office Wire, And Book of Instructions
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These Instruments are warranted to work well on a line from a few feet to five miles. For cheaper outfits see other advertisement. Send stamp for descriptive circular, giving full particulars of instruments and prices.

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Any person in good health of not less than 18 or more than 45 years of age, who is employed in telegraphic service, and is otherwise qualified as required by the By-Laws, is eligible to membership; and should a member in good standing leave the Telegraphic service, but continue to pay all dues assessed and otherwise conform to the Constitution and By-Laws, he can retain his membership.

The initiation fee is \$2. \$1,000 will be paid to the beneficiary of a deceased member within 60 days after verification of claim; and in the case of a member who has been three years, next preceding date of death—in good standing, the claim is indisputable.

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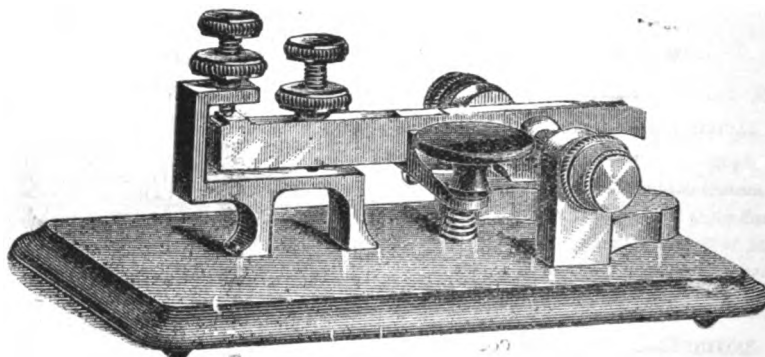
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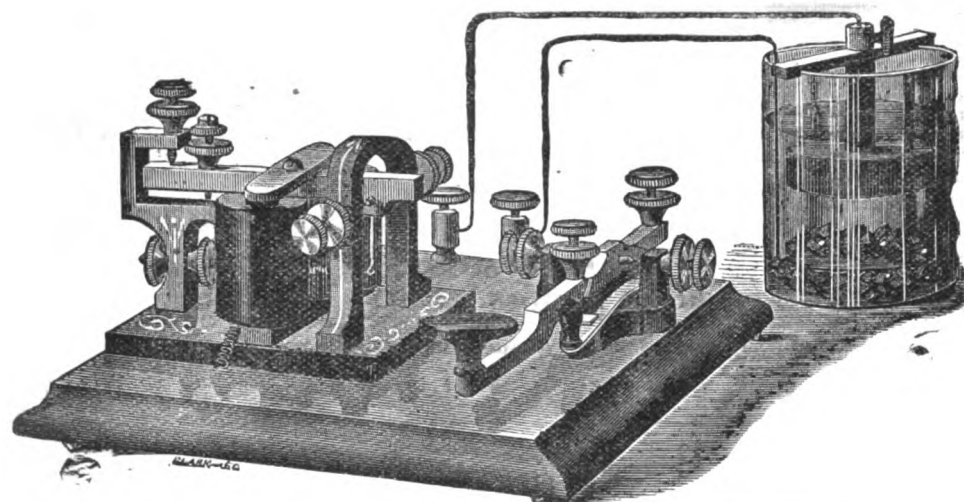
This Key is very fine finish nickel-plated, and presents a beautiful appearance, is easy to handle and WARRANTED NEVER TO STICK. It has been extensively tried and has received the endorsement of the best operators in the country. It embodies the only true principle to prevent a Key from sticking by having a great separation between the anvil and hammer, (without increasing the play of the Key lever,) thereby preventing the formation of the "Electrical Arc" between the platina points, which is the PRIMARY CAUSE OF STICKING KEYS. We claim this Key will never fail to make contact.

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This Key is made ENTIRELY OF BRASS NICKEL PLATED, with hardened platina points, and it is put forward to meet the long existing demand for a CHEAP, LIGHT, EASY WORKING, FIRST CLASS KEY, and is without doubt the CHEAPEST and BEST Key EVER OFFERED FOR THE MONEY.

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Only \$5.00. Not the Cheapest, but Guaranteed the Best.



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Price, Complete Outfit.....	Money in advance, \$5.00
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Remittances should be made by P. O. Money Order, Registered Letter, Draft or Express, which will insure safe delivery. Send for circulars.

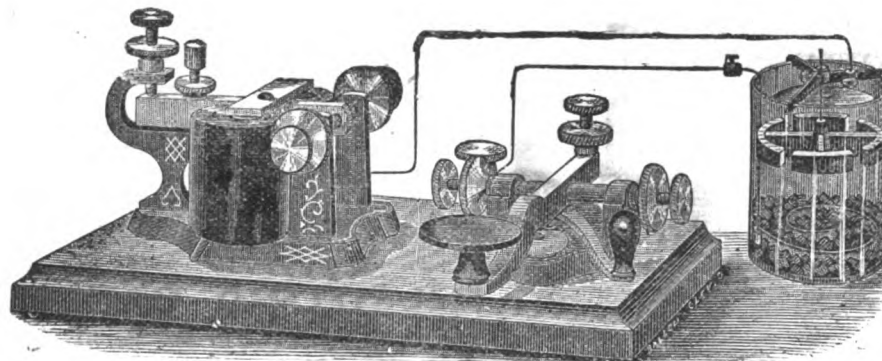
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This Company, owning the original patents of Alexander Graham Bell for the Electric Speaking Telephone, and other patents covering improvements upon the same, and controlling, except for certain limited territory, under an arrangement with the Western Union Telegraph Company, the Gold and Stock Telegraph Company, the American Speaking Telephone Company and the Harmonic Telephone Company, the patents owned by these companies, is now prepared to furnish, upon application, either directly or through any of its agents, telephones of different styles, and applicable to a variety of uses.

This Company desires to arrange with persons of responsibility for establishing

DISTRICT OR EXCHANGE SYSTEMS

in all unoccupied territory, similar to those now in operation in all the principal cities in this country.

It is also prepared to supply instruments for

PRIVATE LINE and CLUB LINE

systems for business or social uses; also telephones for

SPEAKING TUBE

purposes, for which instruments will be leased for a term of years at a nominal rental.

This Company will arrange for telephone lines between cities and towns where exchange systems already exist, in order to afford facilities for personal communication between subscribers or customers of such systems.

We respectfully invite attention to the foregoing, and any further information relating thereto can be obtained from the Company at

No. 95 MILK STREET,
BOSTON, MASS.

All persons using telephones not licensed by this Company are hereby respectfully notified that they are liable to prosecution, and for damages for infringement, and will be prosecuted accordingly to the full extent of the law.

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IT LASTS FOR YEARS

In earth, air or water, and is recommended and endorsed by all the leading men in the telegraphic profession

THE

DURABLE QUALITIES OF KERITE

RECOMMENDED BY THE

CHEAPEST AND MOST ECONOMICAL

insulator for all telegraphic purposes.

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CABLES

of any number of conductors or size of insulation furnished at short notice.

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of all sizes for

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Sole Patentee,

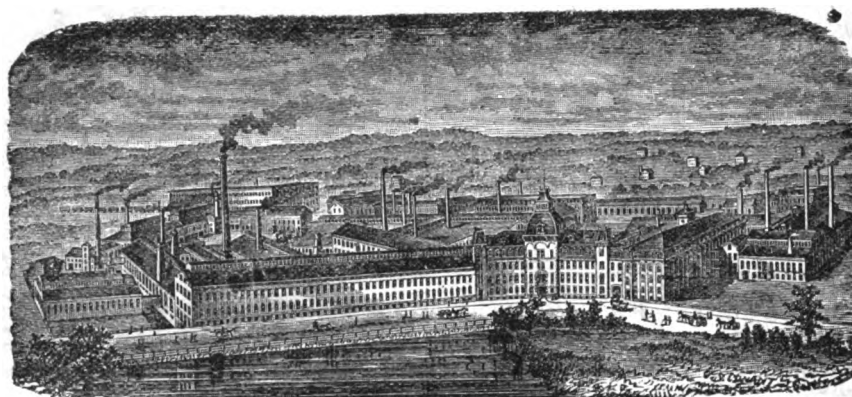
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O. B. HOFKINS, General Agent.

TELEGRAPH WIRE.

WASHBURN & MOEN MANUFACTURING COMPANY.

REMARKED 1861. CAPITAL \$1,500,000.



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21 CLIFF STREET, NEW YORK.

215 LAKE STREET, CHICAGO.

This Company having given careful attention to Telegraph Wire from the introduction of the Art of Telegraphy, and especially with reference to the conditions necessary to highest electric conductivity, does not hesitate to recommend this class of its products as unequaled in that particular.

Being the first to

MAKE A SPECIALTY OF TELEGRAPH WIRE,

and anticipating at an early day the great demand that would exist for that article, they have adopted and fully proved certain methods and appliances for the production of Telegraph, as well as of Telephone Wire, which are peculiar to themselves. Among them may be mentioned the

PATENT CONTINUOUS ROLLING MILL,

PATENT CONTINUOUS GALVANIZING BATH,

AND THE BELGIAN ROLLING MILL,

(In connection with the DOUBLE ROLLING FURNACE.)

All Wire made by this Company for Telegraph or Telephone purposes is thoroughly tested before shipping, with regard to Conductivity, Tensile and Torsion strength, as well as Elongation. Prices and terms for Telegraph or Telephone Wire, Plain, Oiled or Galvanized, given upon application. N. B.—The qualities known as Extra Best Best (E. B. B.) and Best Best (B. B.), kept constantly in stock.

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This Company furnishes to Boards of Trade, Exchanges and private subscribers, at their places of business, by

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GOLD, STOCKS, PRODUCE, COTTON, PETROLEUM, AND
GENERAL COMMERCIAL NEWS REPORTS.

ALSO

SPORTING NEWS,

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AND OTHER GAMES

Gathered at the most important centres of information in the United States and Europe, through the agency of experienced reporters.

The special attention of Western Union Managers and others is called to the

PRIVATE LINE

branch of its business and especially to the use of the Telephone for

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OFFICES with MILLS and FACTORIES,

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The Company will put up and maintain

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For particular information application may be made to any superintendent or manager of the Western Union Telegraph Company.

GEORGE B. PRESCOTT, Vice-President.

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SAM'L BOARDMAN, Agent.

Manufacture and sell, under Letters Patent No. 65,019,

GUTTA PERCHA INSULATED

SUBMARINE, UNDERGROUND, AERIAL, OFFICE,

Canal, Land-Covered, Telephone, Torpedo and Hemp Armour

CABLES.

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MAGNET WIRE, TELEPHONE FLEXIBLE COILS,

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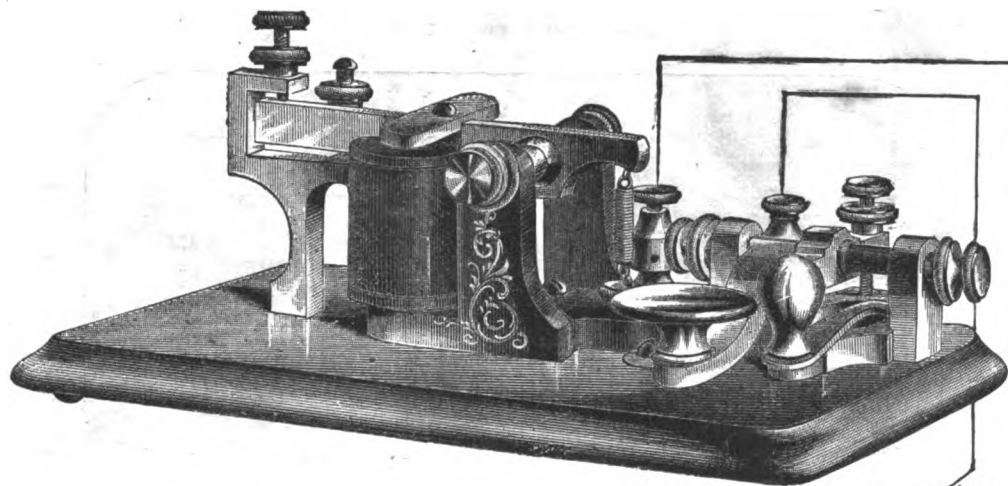
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AGENT, L. G. TILLOTSON,

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The "Morse" Learners' Instrument.



THE BEST.

Price, \$450, complete with Battery, Book of Instruction, Wire, Chemicals, and all necessary materials for operating.

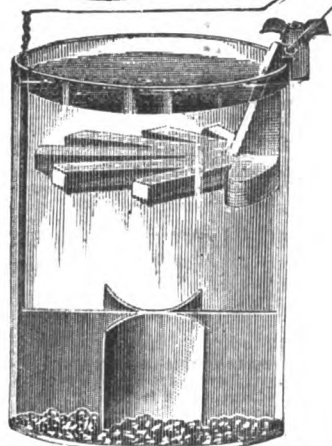
"Morse" instrument alone, without battery.....	\$3.80
"Morse" instrument without battery, and wound with fine wire for lines of one to fifteen miles.....	4.50
Cell of battery complete.....	.65
"Morse" Learners' Instrument, without battery, sent by mail.....	4.30

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(Successor of JOSEPH MOORE & SONS)

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JANESVILLE, WISCONSIN.

This Institution not only teaches Telegraphy in a thorough manner, but places its graduates in offices where, receiving a small salary at first, they are enabled to work upward according to their ability. This is done by virtue of an arrangement, now of five years standing, with the system of city lines in Chicago known as the Metropolitan Telegraph Company, having over 100 offices, and worked in connection with lines to all parts of the country. These city lines draw their operators from this school, placing them first in sending offices and afterwards promoting them according to merit. The superintendents of telegraph of the different railroads centering at Chicago, employ many men from the city lines, and the leading telegraph companies do the same, thus making a constant and steadily increasing outlet for the students of this school.

We do not pretend to make our students first class operators, nor to obtain for them first class situations. We simply claim to make them competent to manage a minor office where they have every opportunity to perfect themselves while receiving a small salary from the start.

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Correspondence solicited.

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A. M. VALENTINE, }**

M. B.—To Railroad Companies in need of Operators we can send reliable young men well advanced in telegraphy, and only needing a few weeks practical work to fit them to run an office, who will go to any station for practice, and assist the agent without pay until assigned to duty. Having made this a specialty for years we can guarantee satisfaction. We have lately furnished the following Companies in this way, to whom we refer: Wisconsin Central, Green Bay & Minn.; St. Paul, Minneapolis, & Manitoba & Chicago; St. Paul, M. & Omaha.

JOURNAL OF THE TELEGRAPH

VOL. XIV.

NEW YORK, DECEMBER 1, 1881.

WHOLE NO. 338.

TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

Fifteenth Annual Meeting.

THE Fifteenth Annual Meeting of the Telegraphers' Mutual Benefit Association was called to order by the President, Mr. J. D. Reid, Wednesday, November 16, at 8 o'clock, P. M., in Room 56, Western Union Building, in this city. Thirty-five members and delegates were present, representing over 1,000 of the members of the Association.

The President briefly but cordially welcomed those present, expressing the pleasure which he felt in thus annually greeting them, and especially those who attended from other places.

He referred feelingly to the death of J. N. Ashley, late Secretary, during the year just ended, and read (the following) letter from Mr. F. W. Jones, who is just recovering from a serious illness.

Mr. J. D. Reid, President:

Dear Sir:—I regret very much my inability to meet with you to-night, and trust that you will have a very pleasant and profitable session.

Very truly,
J. W. JONES.

BROOKLYN, November 16, 1881.

On motion of A. H. Watson, Mr. J. D. Reid was appointed Chairman of the meeting. Carried.

On motion, Mr. Watson D. Schram was appointed Secretary of the meeting. Carried.

The President announced the appointment of the following Committee on Credentials: Messrs. W. H. Young of Washington; Chas. O. King of Albany, and G. L. Lang of Dennison, Ohio.

The reading of the minutes of the last meeting was dispensed with.

The President then read his report as follows:

THE PRESIDENTS' REPORT.

To the Members of the Telegraphers' Mutual Benefit Association:

It is a great gratification to meet you again at this the fifteenth anniversary of your association. This is enhanced by the belief that we come together to fight no battles, but to consult together with patience and kindness respecting our mutual interests. I trust this may always mark these annual gatherings and by so much strengthen the bonds which bind us not only as members of a useful institution but as friends and companions in honorable labor.

The year just closed, although not marked by any notable increase, has been on the whole healthy and prosperous.

The membership at the last annual meeting was..... 2193

New memberships and restorations during the year numbered..... 122

In all..... 2,360

During the same period there have been 23 deaths—two more than the year previous, and 91 lapses by

default of the payment of assessments and 2 resignations, in all..... 115

Leaving a membership of..... 2,145

The total receipts during the year from all sources were..... \$27,968.96

Which, with the balance on hand at the beginning of the year..... 2,978.14

\$30,947.10

The death claims, under the first division during the year, including a small amount of refunded fees and assessments, amounted to.... 26,081.00

Current expenses..... 1,678.44

Less chargeable to second division..... 26.75

1,577.69

\$27,599.69

Leaving a balance on hand of..... \$3,347.41

The actual balance is somewhat in excess of the amount stated, there being nearly \$200 of advanced payments not mentioned therein.

The interest received from deposits with the Western Union Company was..... 186.96

Interest on bonds..... 1,470.00

\$1,656.96

or within a few dollars of the entire current expenses of both divisions during the year, so that, as heretofore, the association is carried on entirely without cost.

The second division showed last year a balance on hand of..... \$119.43

The receipts of the year were..... 261.00

400.42

Payments..... 241.50

\$68.92

The reserve fund is represented by 21 \$1,000 bonds of the W. U. Telegraph Co., the market value of which to-day is \$24,570, showing a large net profit since their purchase. In all respects I deem the condition of the association the subject of sincere congratulation.

One of the sad events of the past year has been the sudden death of Mr. Ashley, whom you so unanimously elected secretary a year ago. He was probably the last man then present who would have been thought of in connection with such an event. Of large frame, full of life, energetic, intelligent and enterprising, his loss has been deeply felt, and by most of us now present he will be greatly missed. His connection with the literature of the telegraph made him known throughout the entire country, and he did an honest share in fighting some of the battles which have marked the progress of telegraphic interests in America. I deem it due to his memory to record the personal and wide spread esteem in which he was held. On the death of Mr. Ashley, the Executive Committee, acting under the by-laws, appointed Mr. W. D. Schram Secretary, who very kindly consented to accept the post, and the duties of which he has performed with such acceptance that he seemed the man to be elected by you in your election to-night. He, however, feels

unable to give the office the attention it deserves, and refuses to be a candidate.

It will be recollected that at your last annual meeting the matter of what is so well known the Boyce claim was taken up and discussed with some warmth. It is not necessary to restate the case, with which you are no doubt all familiar. The association rejected the claim, but left it to the members to assess themselves, and pay or not, as they chose. It is a subject of just pride to say that in a very few weeks, in response to a simple circular, presenting the matter to the voluntary action of the members, a sum nearly equal to the full amount of a regular assessment was received, and promptly placed into Mrs. Boyce's hands. Nothing could better exhibit the spirit which pervades the association, and which I trust it will never lose.

One of the questions proposed for discussion to-night is one based on my own report of last year, but which I either did not clearly express or which the committee, in part, at least, misunderstood. My conviction is very decided that no one should enter the association with the expectation of paying less than an average assessment of one dollar per month. I believe also that any assessments which show a lower average is misleading, and, in the end, hurtful. What I meant to say was, not to make one assessment monthly take the place of the calling of assessments at the time of a death, but that I believed it would greatly strengthen the association if the Executive Committee were empowered to make twelve assessments per annum, and establish that as the minimum cost to members. It struck me then as it strikes me now, that this would be a very reasonable compromise between those of us who see wisdom in a largely increased reserved fund, and those who deem it wisdom to keep the surplus low. In the two years just closed, had \$1 per month been made the minimum of assessments, the reserve fund would now have been increased over \$10,000, and that much added security been given for your perpetuity. What I desire to see is not so much a large reserve, as something that will give me the assurance that when our death rate increases, as seems reasonable to expect, I may not see this association built, as it is, upon the high hopes of so many worthy men, without the abilities to meet, without danger, every preferred claim.

As to assessments themselves, I am, as I have been, unalterably opposed to their being made on any basis but that of actual death. On that alone can we base a proper and legitimate accountability and on that alone can we declare a profit for non-payment. While, however, expressing these views, I desire to avoid the introduction of all questions unnecessarily agitating, while I yet must be faithful in expressing what I deem to be your interests in common with my own.

I have now only to congratulate you on 15 years of great usefulness and prosperity, and to again desire your combined success. JAMES D. REID.



